Motivational responses to physical activity and dietary policies: translating success from the smoking context.

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Motivational responses to physical activity and dietary policies: translating success from the smoking context.

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Abstract

Obesity rates are growing at an alarming rate and new solutions are urgently needed (WHO, 2010). This thesis aimed to explore the potential to translate some of the lessons learnt from the UK's successful tobacco control approach to combating obesity, using Self Determination Theory (SDT, Ryan & Deci, 2000) as a theoretical framework to explore the mechanisms of policy level factors influence on individual motivation. This was explored in three studies using a mixed methods approach. Qualitative Study 1 aimed to explore people's experiences of tobacco control and obesity policies. The results suggest that current tobacco and obesity policy climates are perceived as controlling and are not perceived as motivating for behaviour change. Study 2 tested the hypothesis generated in Study 1, that exaggerated images (i.e. morbidly obese figures) accompanying articles about the health risks of being overweight would prevent overweight people from identifying with these risks. The results demonstrated there was no effect on identification with the message, however such images cause individuals to visually underestimate the level of obesity associated with health risks. Study 3 pilot tested a campaign-style intervention which was translated from the tobacco domain. It involved a snack-swapping intervention designed to help people to increase their fruit and vegetables intake while supporting their autonomous motivation, and aiming to provide an online environment to normalise this aspect of healthy eating. Participants had higher intake of fruit and vegetables as a results of taking part in the intervention, however their intake of unhealthy snacks was not reduced. Applying SDT as a theoretical approach was useful as a means of understanding people's responses to legislation, however the results emphasized challenges in implementing strategies which aim to create autonomy supportive climate at public policy level. New insights for policy development stemming from the three empirical studies have been outlined.

List of commonly used abbreviations

DH- Department of Health

EU- European Union

HMIEM- Hierarchical Model of Intrinsic and Extrinsic Motivation

SDT- Self-Determination Theory

WHO- World Health Organisation

CHAPTER 1: Introduction

Obesity is a rising health problem worldwide. Currently one billion adults are overweight and 475 million are obese (International Obesity Taskforce, 2010) and if current obesity trends continue, by 2015, 2.3 billion adults will be overweight and more than 700 million will be obese (World Health Organization, 2011). The prevalence of obesity is higher in developed countries. In 2011, in England, 41% of men and 33% of women aged 16 or over were classified as overweight, and 24% of men and 26% of women were classified as obese (The Health and Social Care Information Centre, 2013). Obesity rates were similar in Scotland and Wales (APS Group Scotland, 2012; Knowledge and Analytical Services, 2012). It is predicted that by 2025, an estimated 47% of men and 36% of women will be obese (predicted national UK average). The economic burden of obesity is also likely to increase, and is projected to reach £37.2 billion per year by 2025 (Butland et al., 2007).

In England, the obesity rates were relatively stable between 1960 and 1980 and the rapid rise in obesity has occurred over the past 30 years— the number of obese adults living in England has more than trebled from 6% of men and 8% of women classified as obese in 1980 to 24% and 26% in 2011 respectively (Rennie & Jebb, 2005; The Health and Social Care Information Centre, 2013). This increase in obesity cannot be attributed to genetic factors as human genes have not changed recently, but suggests instead that changes in the environment which moderate the behavioural expression of genetic susceptibility to weight gain are driving the obesity epidemic (Hill, Wyatt, Reed, & Peters, 2003). There is convincing evidence that high intake of energy-dense micronutrient-poor foods and sedentary lifestyle promote weight gain (Joint WHO/FAO Expert Consultation, 2003; World Cancer Research Fund, 2007). Therefore, there is potential to prevent the growing burden of obesity by targeting unhealthy diets and low levels of physical activity (World Health Organisation, 2004). These can be addressed by the introduction of public health policies which are defined as “decisions, plans, and actions that are undertaken to achieve specific health care goals within a society” (World Health Organisation, 2013b).

The rationale for introducing societal level interventions stems from a premise that individuals are not exclusively responsible for their food intake and physical activity levels as the degree to which lifestyle choices regarding diet and physical activity are freely made is limited (Nuffield Council on Bioethics, 2007). There are many factors that influence people’s dietary and physical activity choices some of which people have no control over. For example, people’s behaviour is to some extent affected by urban planning (e.g. lack of

cycling lanes) or socioeconomic factors (e.g. low price of junk food) (Holm, 2007; Nuffield Council on Bioethics, 2007). Individuals might also not be aware of the consequences of their action on their health and might not fully appraise long term health consequences of their behaviours (Wanless, 2004). Public health policies also aim to protect vulnerable groups such as children who for example are not able to separate advertising claims from facts or balance advertising claims with information about healthy eating (House of Commons Health Committee, 2004). The introduction of obesity policies also aims to encourage parties such as food manufacturers to acknowledge that they have a role to play in addressing obesity (e.g. food manufacturers could develop healthier products to provide more choice). Therefore, organisations that are responsible for introducing public health policies have an important role to play in helping individuals to lead a healthy lifestyle.

For a number of organisations worldwide, tackling the obesity epidemic is a priority in their mission to improve the health of people worldwide*. In 2004, the World Health Organisation* adopted the *WHO Global Strategy on Diet, Physical Activity and Health* (World Health Organization, 2004). This strategy provides recommendations for partners, civil society, private sector and nongovernmental organisations on the promotion of healthy diet and physical activity. In 2008, building on the *WHO Framework Convention on Tobacco Control* and the WHO *Global Strategy on Diet, Physical Activity and Health*, the WHO published *2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases* (World Health Organization, 2008a), a plan of action to strengthen efforts to control and prevent four of the world's biggest killers (cardiovascular diseases, diabetes, cancers and chronic respiratory diseases) and their common risk factors (tobacco, unhealthy diet, physical inactivity and alcohol use). The EU also recognizes an opportunity to reduce morbidity and mortality by improving diets and increasing levels of physical activity. In 2007, the European Union published a white paper *A Strategy for Europe on Nutrition, Overweight and Obesity Related Health Issues***,** outlining a strategy to reduce ill health as a result of being overweight and obese (Commission of the European Communities, 2007), which emphasized the importance of personal responsibility for a healthy lifestyle; however, environments should be conducive to supporting a healthy lifestyle.

In the UK, the first explicit attempt to address obesity was the *Health of the Nation* white paper (1992) which set a target to reduce the number of obese (BMI >30) women aged 16-64 years by at least 33% (from 12% in 1986-1987 to 8% in 2005) and the number of obese men by at least 25% (from 8% to 6%) (DH, 1992). Since then, four new white papers

addressing health have been published (*Saving lives: Our Healthier Nation*, DH, 1999; *Choosing Health: Making Healthy Choices Easier*, DH, 2004; *Healthy Weight, Healthy Lives- a cross-government strategy for England*, DH, 2008; *Healthy lives, healthy people: our strategy for public health in England*, DH, 2010), with each newer white paper setting less ambitious obesity targets as the targets set out in previous documents were not achieved. For example, obesity targets set in the 1992 white paper to reduce obesity among women to 8% and among men to 6% by 2005, were far from being met as by 2005 there was a twofold increase in obesity among women (24.8% of women were obese in 2005) and an almost threefold increase in obese men (23.1% in 2005) (NHS Information Centre, 2006). The most recent white paper *Healthy lives, healthy people: our strategy for public health in England* took a more cautious approach and did not set a specific target ("a downward trend in the level of excess weight averaged across all adults by 2020"; DH, 2011b, p.3). This shows that the obesity policy in England has been largely unsuccessful in reversing the obesity trend— although there is some evidence that progress is being made in introducing policies intended to tackle childhood obesity, as since 2005 childhood obesity rates in England have levelled off (National Obesity Observatory, 2010b). Therefore, new solutions are urgently needed.

Many policy makers claim that the obesity epidemic requires policies that are innovative and forward looking (Hallsworth, Parker, & Rutter, 2011; Office of the First Minister and Deputy First Minister, 2003); however, this focus on innovation might lead to a neglect of the existing evidence or the evidence from other disciplines. Many researchers recommend that lessons could be drawn from the tobacco experience for organising more successful obesity control (Dorfman, Woodruff, Lingas, Wallack, & Wilbur, 2004; Engelhard, Garson, & Dorn, 2009; Garson & Engelhard, 2007; Green et al., 2006; Mercer et al., 2003; West, 2007; Yach, Hawkes, Epping-Jordan, & Galbraith, 2003; Yach, McKee, Lopez, & Novotny, 2005), as the reduction in smoking rates in the UK has been declared one of the greatest achievements of public health of the 20th century (Lewis, Arnott, Godfrey, & Britton, 2005). The UK has been a leader in tobacco control (Joossens & Raw, 2007) and tobacco smoking declined by approximately 25% between 1974 and 2010 from 45% to 20% of adults being smokers (ASH, 2012). It is believed that tobacco control has achieved this level of success as a result of a comprehensive approach targeting a number of settings and behaviours at the individual-level as well as targeting complex lifestyle and environmental factors (Hopkins et al., 2001). However, the evidence cannot be directly translated from smoking and applied to the obesity domain by simply imitating apparently successful initiatives, because important differences between smoking and behaviour associated with obesity exist and should be acknowledged; for example, food and physical activity are essential to life, while

tobacco is not (Brownell & Warner, 2009). What further makes the translation of the evidence challenging is the fact that little is known about the mechanism of tobacco control action, that is, how these policies that are introduced on a global level affect individual level motivation and behaviour. For example, if economic analyses indicate that increasing the tax on unhealthy foods is effective and changes food consumption patterns (Brownell et al., 2009; Powell & Chaloupka, 2009; Sturm, Powell, Chriqui, & Chaloupka, 2010), it is not known why and how these taxes affect food consumption and the behaviour of individuals (Michie, 2008). Understanding the mechanism of the policy action (i.e. mediators and moderators) could enable more successful translation of the evidence from tobacco control into obesity. For example, if research established that warning labels on tobacco products are effective as they target the perceived risk of smoking-related disease, similar labels for food products high in fat and sugar could be developed targeting similar predictors (rather than for example labels that aim to increase the consumer's nutritional knowledge).

Understanding the mechanisms through which policies bring about their effects could be enhanced by the use of a behaviour change theory (Michie & Prestwich, 2010). Behaviour change theories specify key concepts that are believed to be causally linked (e.g. intentions are the primary driving force of the behaviour in the Theory of Planned Behaviour, Ajzen, 2008). These key concepts could be used to explain the mechanism of the interventions and provide more proximal targets for behaviour change intervention as, in theory, changing these constructs will lead to a behaviour change (Hardeman et al., 2005). Once the constructs are specified, this allows the selection of appropriate intervention techniques which can result in stronger effects of the intervention (Albarracín et al., 2005) as factors believed to be responsible for behaviour change will be targeted. Studies developed within a conceptual framework can aid the understanding of the effectiveness or ineffectiveness of the intervention (Michie & Abraham, 2004). The use of theory also enables the accumulation of the evidence on effectiveness across different populations, settings and contexts (and for example enables the translation of the evidence from tobacco control into obesity). The use of theory could also help expand basic science and offer potential for better policy outcomes (Michie & Prestwich, 2010).

However, social policy science is currently very separate from behavioural sciences and there is a lack of attention in policy evaluation research on the individual effects of policies on motivation. As argued earlier, introducing insights from behaviour sciences (most importantly the use of theories of behaviour change) could aid our understanding regarding the mechanism of these policies on individual motivation. Therefore, the current thesis will explore how policies influence people's motivation for behaviour change. Motivation for

behaviour change was selected as a target behaviour as the success of obesity policies is largely dependent upon the ability of these policies to motivate people to change their behaviour (Nuffield Council on Bioethics, 2007). Therefore, arguably, if people are not motivated to change, they will not engage in obesity policies that are provided to help them lead a healthier lifestyle. Self-Determination theory (SDT), a macro theory of human motivation, well-being and personality development (Deci & Ryan, 1985b; Deci & Ryan, 1991), was selected as an appropriate theory to be used in the current thesis as according to SDT people's motivation is a primary determinant of behaviour, thus behaviour change will be achieved through changing a person's motivation.

SDT is based on a concept that the quality of motivation rather than its quantity, amount or intensity determines people's behaviour and it recognizes that multiple reasons might drive people's behaviour (Ryan, Patrick, Deci, & Williams, 2008). However, the main reason for the use of SDT in the current thesis is the issue of control (the extent to which people act because they feel pressured to behave in a certain way). Target behaviours of obesity policies (i.e. healthier diets and higher levels of physical activity) and the way policies addressing these two behaviours are introduced can be perceived by policy recipients as controlling. SDT is well established at describing how controlling environments can undermine motivation (Deci & Ryan, 2008). According to SDT, if the social environment is experienced by individuals as controlling or pressuring them to behave in a certain way, this would result in extrinsic motivation (engaging in an activity to attain an end outcome of the activity that is separate from the behaviour itself, thus this behaviour stems from external control) where behaviour is less likely to be maintained (Deci, Eghrari, Patrick, & Leone, 1994).

SDT has been refined over several decades of research and many efficacious clinical interventions have been developed based on its premises (e.g. Silva et al., 2010, Williams et al., 2006). It specifies the mediators (i.e. the sequence by which behaviour change occurs) or moderators (i.e. under what circumstances intervention exerts optimal effects) of behaviour change (Deci & Ryan, 2002). These constructs have been operationalized so SDT offers suggestions for specific strategies (e.g. how an autonomy supportive climate can be created) (Deci et al., 1994). SDT has been previously applied in studies looking at policies, but usually these have been studied at a more local level (in schools or workplaces). This PhD project is the first to examine whether it is useful as a means of understanding people's responses to public policy. The overarching research question is to explore motivational responses of individuals to tobacco and obesity control policies, with the use of SDT as a tool to help interpret the findings, and explore the potential for

translating some of the lessons from tobacco into the obesity context. A mixed methods approach is taken therefore both qualitative and quantitative data will be collected and analysed to provide a better understanding of the phenomenon studied.

The first aim is to explore people's experiences of tobacco control and obesity policy (how they respond to policy, to identify whether and in what ways policy may relate to their motivation). These studies are used to identify particular contexts related to tobacco policy that may be relevant in the obesity policy perspective. Study 1 (Chapter 3) aims to explore attitudes and motivational responses towards policies that aim to reduce smoking rates among smokers and ex-smokers using a qualitative methodology. Study 2 (Chapter 4) presents a second qualitative study focusing on people's interpretations of and responses to existing and hypothetical future obesity policies and the potential impact on their motivation for behaviour change. Study 1 also aims to explore similarities between smoking and behaviours associated with weight control (eating and physical activity) with respect to interventions introduced at a policy level as an insight into views of individuals might enable more successful translation of the evidence from the tobacco context.

The findings of Study 1 highlighted several ways in which participants felt social policies influenced their motivation to control their weight, of which two hypotheses were then selected and tested in subsequent studies. Study 2 (Chapter 4) therefore explores how visual images used in the media and high profile health promotion campaigns may play a role in undermining the motivational content of health messages by causing people to visually underestimate the degree of overweight associated with health risks. Study 3 (Chapter 5) tests an intervention designed to target two factors participants reported as undermining their motivation to maintain dietary changes, namely reducing social undermining of attempts to eat a healthy diet and increasing motivation and self-efficacy for dietary change. The findings of all four studies will be drawn together and synergies and differences in the translation of policy elements between health contexts explored. The results of this thesis might help to guide how policies should be implemented, in ways that promote perceptions of individual autonomy rather than external control.

CHAPTER 2: Literature review

2.1 Section 1: Obesity and health

2.1.1 Obesity definition and measurement

Obesity is defined as “an abnormal or excessive fat accumulation that may impair health” (World Health Organization, 2011). According to the World Health Organisation criteria, the most useful population level measure of being overweight or obese in adults is Body Mass Index (BMI), defined as the weight in kilograms divided by the square of the height in meters (kg/m²). The underlying assumption in the use of BMI is that the most variation in people’s weight between people of the same height would be due to differences in fat mass (Kopelman, 2000). A person with a BMI below 18.5 kg/m² is defined as underweight; with a BMI between 18.5 and 24.9 kg/m² as normal weight, 25-29.9 kg/m² as overweight, and 30 kg/m² and over as obese. The BMI classification of overweight and obesity can be applied to both men and women and to all adult age groups (WHO, 2011). However, BMI is only a rough estimate of the degree of fatness and it is possible that individuals with the same BMI will have different levels of fat mass. For example, aging is associated with an increase in fat and decrease of lean mass, thus the BMI measure does not take into account the true impact of excess body fat in older people (Zamboni et al., 2005). In addition, the 30 kg/m² cut off point for obesity was largely derived from mortality statistics from Caucasian populations while cross cultural differences in associations between BMI, percentage of body fat, and health risks exist (WHO Expert Consultation, 2004); therefore, the 30 kg/m² obesity cut off might not fit all populations (Dudeja et al., 2001). For example, Asian populations have high risks of cardiovascular disease (CVD), type II diabetes and mortality from other causes at relatively lower BMI compared with Caucasian populations. Thus lower BMI for health risks associated with obesity for Asian populations between 23 and 27 kg/m² has been suggested (Goh, Tain, Tong, Mok, & Wong, 2004).

BMI does not distinguish between fat mass and lean muscle mass as it is a measure of general adiposity, irrespective of fat distribution (Chan & Woo, 2010). Individuals with excess fat in the abdominal region (abdominal obesity) are at increased risk of a number of chronic diseases compared with those with general adiposity (Pischon et al., 2008). Therefore, a number of measures of abdominal obesity such as waist circumferences, or waist-to-hip ratio that might be a better predictor of health risks have been suggested. Waist circumference is measured at the midpoint between the lower border of ribs and upper border of the pelvis, and proposed cut-off points for substantially increased disease risk (type 2 diabetes, hypertension, and CVD) are ≥102 cm (≥40 in) in men and ≥88 cm (≥35 in)

in women from Caucasian populations. Waist to hip ratio is the ratio of the circumference of the waist to that of the hips. Suggested cut-off points for waist-to-hip ratio is 1.0 in men and 0.85 in women with values above suggesting abdominal fat accumulation (Expert Panel on the Identification Evaluation and Treatment of Overweight and Obesity in Adults, 1998). Although a number of studies have shown that these measures of central adiposity can better help to predict health risks associated with obesity such as myocardial infarction (Yusuf et al., 2005), all-cause mortality and cardiovascular disease mortality (Welborn & Dhaliwal, 2007), measures of abdominal obesity are not good predictors of all health risks associated with obesity. For example, BMI is a better predictor of hypertension than waist-hip ratio (British Nutrition Foundation Task Force on Obesity, 1999). Therefore, it has been suggested that both measures (a measure of general and abdominal obesity) should be used in assessment of the risks associated with excess weight, in particular for persons within the normal BMI range - as measurement of the BMI alone cannot discriminate between people with normal BMI but with high fat mass content due to abdominal obesity (Pischon et al., 2008).

2.1.2 Obesity prevalence

Obesity is a rising health problem worldwide. According to the most recent data from the International Association for the Study of Obesity & International Obesity Taskforce, in 2010, 1 billion adults worldwide were overweight and 475 million were obese (International Obesity Taskforce, 2010). If current obesity trends continue, by 2015, 2.3 billion adults will be overweight and more than 700 million will be obese (WHO, 2010). A recent EU survey revealed that more than half of the EU population is overweight or obese. These trends are even higher in the UK; compared with 19 EU Member States for which data are available, in 2008/2009 the UK had the highest proportion of obese women (23.9%), while British men were rated as the second most obese in Europe (22.1%) (European Commission Eurostat, 2011). In addition, the UK demonstrates some of the worst trends in the acceleration of obesity compared with other European countries, especially for childhood obesity (European Union Public Health Information System, 2009).

The obesity rates in England were relatively stable between 1960 and 1980, then the rapid rise in obesity began in the 1980s and the prevalence of obesity in England has more than trebled in the last 30 years (Rennie & Jebb, 2005). The proportion of adults with a healthy BMI decreased between 1993 and 2011 from 50% to 39% among women and from 41% to 34% among men (The Health and Social Care Information Centre, 2013). In 2011, in England, 61.7% of adults were classified as either overweight or obese (41% of men and

33% of women aged 16 or over were classified as overweight, and 24% of men and 26% women of were classified as obese). 47% of women and 34% of men had a raised waist circumference. Among children aged 2-15, 31% of boys and 28% of girls were classified as either overweight or obese (The Health and Social Care Information Centre, 2013). Compared with other UK regions, Scotland had slightly higher obesity rates (in 2012, 64.3% of adults were classified as being overweight or obese, APS Group Scotland, 2012), while Wales had lower obesity rates (57.3% of adults were classified as being overweight or obese, Knowledge and Analytical Services, 2012) compared with England (61.7%). It is predicted that by 2050, 60% of men, 50% of women and 25% of children will be obese (predicted national UK average). By that time, the proportion of adults within the 'healthy weight' category will decline to less than 10% among men and to about 15% among women (Foresight, 2007).

2.1.3 Determinants of obesity

Numerous studies have evaluated the relative genetic and environmental contribution to weight gain (Maffeis, 2000) and their results suggest that genetic inheritance accounts for between 30% and 40% of the variance in the BMI, while environmental for 60% - 70% (Pi-Sunyer, 2002). However, human genes have not changed so this increase in obesity cannot be attributed to genetic factors but suggests instead that changes in the environment which moderate the behavioural expression of genetic susceptibility to weight gain is driving the obesity epidemic (Hill et al., 2003). Possible factors in the environment that promote overconsumption of energy include changes in the food supply with increased energy supply per capita (Seidell, 2000); lower price and greater availability of energy dense food (e.g. fast food) (Finkelstein, Ruhm, & Kosa, 2005); changes in the food consumption patterns with increased intake of energy-dense foods, high in fat and carbohydrates; increased intake of sugar-sweetened soft drinks and fruit juices (World Health Organization, 2011); increased frequency of eating outside the home in restaurants or eating food prepared away from home (Finkelstein et al., 2005; French, Story, & Jeffery, 2001). In addition, the number of snacks individuals consume per day and the calorie density of these snacks have increased; the size of the portions being consumed has also increased significantly over recent years (Putnam, Allshouse, & Kantor, 2002).

Environment not only appears to promote increased consumption of calorie-dense foods, but also discourages physical activity and increases sedentary time. These changes have been observed over the past three decades due to changes in the working and home environment such as increased sedentary nature of work, advances in workplace

technology, changes in modes of transport with increased use of automobile transportation, increasing urbanization, use of labour saving devices at home, and more sedentary leisure activities such as television viewing or computer game playing (French et al., 2001; Joint WHO/FAO Expert Consultation, 2003). However, it is important to distinguish between increased sedentary behaviour and lack of moderate- or vigorous-intensity physical activity and its independent association with increased rates of obesity, as sedentary behaviour is not the same as lack of physical activity (Hu, Li, Colditz, Willett, & Manson, 2003; Jakes et al., 2003). Sedentary behaviour is sitting or lying and is characterised by low basic metabolic rate (basic metabolic rate< 2), while moderate- or vigorous-intensity physical activity requires a moderate or large amount of effort and is characterised by higher basic metabolic rate (basic metabolic rate ≥3). These two are independent of each other and can co-exist; for example, someone can engage in regular vigorous-intensity physical activity, but at the same time spend a considerable amount of time engaged in sedentary behaviours (Sugiyama, Healy, Dunstan, Salmon, & Owen, 2008). The evidence from the U.S. indicates that the percentage of adults who engage in light-to-moderate leisure physical activity has actually increased over the past 20 years, suggesting that increased sedentary behaviour and/or decreased non-leisure time physical activity such as house chores might be responsible for the rise in obesity prevalence, independent of participation in leisure-time physical activity (Finkelstein et al., 2005). This distinction between sedentary behaviours and physical activity is also important as it has provided an additional insight into how each of them is associated with the odds of being overweight or obese and which might be targeted in obesity prevention. A study by Sugiyama et al. (2008) demonstrated that those who do not engage in enough moderate to vigorous physical activity, but spend less time in sedentary behaviours have a similar risk of being overweight or obese as those who are sufficiently physically active, but spend more time engaging in sedentary behaviours-suggesting that obesity campaigns might promote both more physical activity and less sedentary activities.

2.1.4 Consequences of obesity

Health consequences of obesity

Obesity is a disease itself (Marmot et al., 2007) and it increases the risk of other diseases, including several of the major causes of morbidity and mortality in the developed world (International Association for the Study of Obesity, 2011). Health risks of obesity in adults include: coronary heart disease, type 2 diabetes mellitus, osteoarthritis (Kopelman, 2000; Must et al., 1999), stroke, respiratory problems such as sleep apnea, gallbladder disease, reproductive disorders such as ovulatory dysfunction (British Nutrition Foundation Task

Force on Obesity, 1999) and dental disease (Joint WHO/FAO Expert Consultation, 2003). According to the report by the World Cancer Research Fund and American Institute for Cancer Research, obesity is associated with an increased risk of some of the common cancers such as breast cancer or colorectal cancer (Marmot et al., 2007). It has been estimated that in England around 20% of cancer deaths in women and around 14% of cancer deaths in men are attributed to obesity (House of Commons Health Committee, 2004).

Economic consequences of obesity

Obesity imposes a significant burden on the economy. Costs associated with treating obesity and its direct consequences (NHS expenditure) in England were between £991 million and £1,124 million in 2002, which constitutes between 2.3–2.6% of all NHS expenditure. However, the societal costs of obesity are much higher, totalling nearly £7 billion for England in 2002 including the cost of state benefits, and indirect costs such as reduced productivity or higher levels of absenteeism (Foresight, 2007). As the prevalence of obesity is increasing, with an estimated 47% of men and 36% of women predicted to be classified as obese in England in 2025, the economic burden of obesity is also likely to increase. The full cost is projected to be £37.2 billion per year by 2025 (Foresight, 2007).

Degree to which obesity consequences are modifiable

Health benefits of weight loss

Modest weight loss (by 5–10% of initial weight loss) is beneficial in disease treatment in patients with already existing weight-related diseases (e.g. hypertension or type 2 diabetes) (Foresight, 2007). Modest weight loss is also effective in preventing or delaying the appearance of type 2 diabetes and hypertension in overweight individuals with no obesity-related comorbidities (Vidal, 2002). Although weight loss is beneficial for overweight and obese patients, stable weight within the normal range throughout the life course (from childhood) has the best health outcomes which has been demonstrated in a number of studies. In a longitudinal study by Harris et al. (1997) of 621 men and 960 women free of coronary heart disease with a mean age of 77 years, the incidence of coronary heart disease was higher among thinner older people who lost weight between middle age to old age and heavier people who gained weight between middle age to old age compared with thinner people with stable weight. Similar findings were obtained in a prospective study by Peters et al. (1995) where 6441 men aged 40-59 years old at baseline were followed for 15 years. Lower mortality was found in those with stable weight compared with those whose weight fluctuated in either direction therefore promotion of a stable weight throughout lifetime represents an important goal for obesity policy.

The role of physical activity

In addition, obesity policy should focus not only on addressing eating habits, healthy weight, but also physical activity as both obesity and inactivity have similar health outcomes and similar patterns of association, with indicators of clinical risk such as fasting plasma glucose or blood pressure (Blair & Church, 2004). Health benefits of being a healthy weight might be limited only to fit individuals and that moderate to high cardiorespiratory fitness might substantially attenuate or even eliminate mortality risks associated with excess weight. Low cardiovascular fitness is often associated with obesity and a sizeable proportion of deaths among overweight and obese individuals might be due to low levels of cardiorespiratory fitness rather than obesity per se. Moderate to high fitness levels substantially reduce the risk of cardiovascular disease and all-cause mortality for all BMI levels (Joint WHO/FAO Expert Consultation, 2003). Therefore, obese individuals who exercise might have better health outcomes than peers who are unfit but of normal weight (Blair & Church, 2004). For example, in a prospective observational study of 25 714 adult men by Wei et al. (1999), healthy weight unfit individuals (with low cardiorespiratory fitness), had higher rates of cardiovascular disease (CVD) or all-cause mortality than obese individuals with at least moderate cardiorespiratory fitness, with low cardiorespiratory fitness being a strong and independent predictor of CVD and all-cause mortality (adjusting for baseline CVD, high cholesterol, type 2 diabetes, smoking and hypertension). Similar findings were observed in a study by Lee et al. (1999), however it is not clear to what degree cardiorespiratory fitness can ameliorate health hazards posed by obesity as the highest risk of morbidity and mortality was seen among individuals who were obese, unfit and inactive (Lee, Sui, & Blair, 2009).

2.2 Section 2: Tobacco control policy

The previous section aimed to provide the evidence that obesity has serious health, financial and societal consequences of obesity and that obesity represents one of the greatest public health challenges of the 21st century (Joint WHO/FAO Expert Consultation, 2003)**.** This section will examine key policy tobacco frameworks worldwide and review tobacco control interventions which are currently accepted as effective. The development of the tobacco control policy in the UK will also be discussed.

2.2.1 Health & economic consequences of smoking

Negative health consequences of smoking (i.e. lung cancer) were first reported more than 60 years ago by Richard Doll and Austin Bradford Hill (Doll & Hill, 1950, 1954). Further investigation into the consequences of tobacco revealed that smoking causes around 30% of cancers, nearly 20% of cardiovascular disease and is linked to a number of respiratory diseases such as chronic obstructive pulmonary disease (ASH, 2010). Smoking is also harmful to those people who do not smoke, but who passively inhale the tobacco fumes. Adults exposed to other people's tobacco smoke face increased risk of cardiovascular disease (Vardavas & Panagiotakos, 2009) and lung cancer (Taylor, Najafi, & Dobson, 2007). The estimated costs of treating illness and disease associated with smoking in the UK in 2005/06 were £5.2 billion, which constitutes between 5.5% of all NHS expenditure. However, the societal costs of tobacco addiction are much higher, nearly £14 billion per annum, including the economic loss due to lost productivity (£2.9 billion), absenteeism (£2.5 billion), lost years of productivity (£4.1 billion), costs of passive smoking (£713 million), cleaning up cigarette butts (£342 million) and the cost of smoking-related fires (£507 million) (ASH, 2010). Despite the negative consequences of tobacco use, 21% of English adults continue to smoke (ASH, 2013).

2.2.2 Key international policy frameworks

Worldwide, deaths from smoking are more numerous than deaths from HIV/AIDS, tuberculosis and malaria combined (World Health Organization, 2009a). The tobacco habit killed 100 million people in the 20th century and it is estimated that in the 21st century it could kill one billion (Jha & Chaloupka, 2000). For both the World Health Organisation and the World Bank, tackling the smoking epidemic is a priority in their mission to improve the health of people worldwide. In 1997, the World Health Organisation and the World Bank began work on a global study of the economics of tobacco control (Jha & Chaloupka, 2000), which resulted in the publication of *Curbing the epidemic: governments and the economics of*

tobacco control (Jha & Chaloupka, 1999). This report concluded that insufficient attention is being paid to the economics of smoking-related deaths and concluded that imposing tobacco control would not harm economies and can bring health benefits. Recommendations for tobacco control and its economic consequences were also presented in this report. The next step in the global fight against the tobacco epidemic was the foundation in 1999 of the Framework Convention Alliance (FCA) working on the development, ratification and implementation of the World Health Organization's *Framework Convention on Tobacco Control* (WHO FTC) (World Health Organisation, 2003) that was adopted in May 2003. It entered into force in February 2005 and, to date, has been ratified by 177 countries (World Health Organisation, 2013c). The WHO FCTC is the world's first global public health treaty, requiring parties to adopt a comprehensive approach to tackling smoking by: limiting the interaction between lawmakers and the tobacco industry (Article 5.3); introducing price and tax measures to reduce tobacco demand (Article 6 & 7); protecting people from exposure to passive smoking (Article 8); regulating the contents of tobacco products (Article 10); regulating packaging and labelling of tobacco products for example by introducing large health warnings (Article 9 & 11); increasing public awareness about the consequences of smoking (Article 12); regulating tobacco advertising (Article 13); introducing measures concerning tobacco dependence and cessation (Article 14); tackling the illicit trade of tobacco (Article 15); restricting sales to minors (Article 16); introducing tobacco-related research and exchange of information among parties (Article 20, 21 & 22). In 2008, the WHO published *MPower- Report on the Global Tobacco Epidemic* (World Health Organisation, 2008b) detailing the current status of tobacco control among the countries that ratified the WHO FCTC and also to help them to fulfil the promise and give them the power to implement necessary changes. The results indicated that none of the governments have fully implemented the key effective interventions and only 5% of the global population is protected by any one of the tobacco control policies, with for example more than half of the countries allowing smoking in public places.

Although the World Bank is concerned with the impact of tobacco control policies on economies, while the WHO FCT aims "to protect present and future generations from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke" (World Health Organization, 2003, p.5), the recommendations prioritised in both documents are similar and represent a comprehensive tobacco control programme. They include the following six strands of tobacco control:

I. Information and health promotion interventions

This strand of tobacco control aims to warn both smokers and non-smokers about the dangers of tobacco, reveal its harmful effect and its negative economic consequences on households and the national budget and inform about the benefits of quitting (World Health Organization, 2008b). These messages could be communicated via counter-advertising, health warnings on cigarette packets or mass-media campaigns. Packet warnings and counter advertising were found to increase the level of awareness and additionally to reduce the marketing effect of tobacco (brand loyalty and user's self-image) (Hammond et al., 2007). The evidence for a health promotion initiative suggests that school-based interventions have little or no effect in the long-term, however their effectiveness might be improved when introduced simultaneously with community interventions and social competence training such as increasing assertiveness or teaching cognitive skills to resist media influences (Thomas & Perera, 2006; Wiehe, Garrison, Christakis, Ebel, & Rivara, 2005). Mass media interventions for preventing the uptake of smoking among young people demonstrate that they can reduce the uptake of smoking, however the evidence to support this claim is not strong (Brinn, Carson, Esterman, Chang, & Smith, 2010). Health promotion was found to be more effective in adults, with more educated people responding to the health promotion information regarding the negative effects of smoking more quickly compared with people with minimal or no education (Hyland, Wakefield, Higbee, Szczypka, & Cummings, 2005; Siegel & Biener, 2000).

II. Reducing the availability and supply of cheap tobacco

Tax increase on tobacco products is the single most effective strategy to reduce tobacco demand and higher taxes lead to a significant reduction in the number of smokers, particularly among young smokers and those with less education (Chaloupka, Cummings, Morley, & Horan, 2002). It is estimated that a tax increase raising the real price of cigarette by 10%, would result in a reduction of smoking prevalence by 4% in high income countries and by 8% in middle or low income countries (Jha & Chaloupka, 2000). However, an increase in tobacco tax and price are associated with an increase in tobacco smuggling, therefore for the increased tax to be effective it should be introduced simultaneously with interventions aimed at tackling tobacco smuggling. What is more, tobacco taxes are strongly regressive, imposing a greater burden relative to resources on the poor than on the rich smokers, thus governments have a responsibility of providing help to smokers (particularly poor smokers) to quit (ASH, 2010).

III. Smoke-free policies

The aim of smokefree policies is to protect citizens from exposure to tobacco smoke in workplaces, public transport and indoor public places. It also reduces the consumption of cigarettes among current smokers as for example they cannot smoke in their workplace (Ludbrook, Bird, & Van Teijlingen, 2004) and it might encourage some smokers to quit (Hackshaw, McEwen, West, & Bauld, 2010; Yurekli & Zhang, 2000). Measureable benefits of the smokefree legislation have been reported. For example, Sims et al. (2010) concluded that the introduction of the smoke-free law in England accounting for factors such as seasonal variation, led to reductions in myocardial infarctions (a 2.4% drop in MI in the first year since the introduction of smoke-free legislation in England) calculated as decreased hospital admissions for coronary events. During that period an estimated £8.4 million was saved in emergency hospital care for heart attacks (almost 10,000 fewer bed days for emergency admissions due to heart attack) (London Public Health Observatory, 2010). Qualitative studies have shown that the smoke-free legislation affects social norms and attitudes towards smoking with smoking becoming less socially acceptable; however, at the same time it can lead to stigmatising smokers (Hargreaves et al., 2010; Ritchie, Amos, & Martin, 2010a). There is also widespread support for the smoke-free law among the public (Fong et al., 2006). However, this policy is only protecting non-smokers in public places, not in their own homes or cars which they might share with a smoker.

IV. Reducing tobacco promotion

Even though the tobacco industry claims that tobacco promotion is not aimed at recruiting new smokers, but to retain old costumers or to encourage brand switching among current smokers, research evidence suggests that adverts are recruiting new smokers and that tobacco advertising increases tobacco consumption (Saffer & Chaloupka, 2000). Tobacco advertisements normalise tobacco use, creating an impression that it is a product no different from other products being advertised, making it difficult for people to understand the health consequences related to smoking (Henriksen, Flora, Feighery, & Fortmann, 2002; Wakefield, Germain, Durkin, & Henriksen, 2006). Tobacco advertising is also often associated with desirable qualities such as youth, independence, happiness or glamour (Charlesworth & Glantz, 2006) and this tobacco imagery is especially appealing to children and young people (Charlesworth & Glantz, 2005). A ban on advertising and promotion is effective only when it is comprehensive i.e. covers all aspects of advertising and promotion (television advertising, outdoor advertising, product placement, sport event sponsoring etc.). A limited ban on advertising will have little or no effect as it will not decrease the

amount tobacco companies spend on advertising, but shift the expenditure to non-banned media (Saffer & Chaloupka, 2000).

V. Support for smoking cessation & harm reduction (helping smokers who cannot quit)

Quitting smoking has major and immediate health benefits for smokers of all ages, even for those with a pre-existing smoking-related condition (USDHHS, 1999). It is estimated that smokers who quit at the age of 30, 40, 50 or 60, can gain respectively about 10, 9, 6 or 3 years of life expectancy (Doll, Peto, Boreham, & Sutherland, 2004). Most smokers want to quit, but many (usually heavier smokers) find it very difficult thus specialist care should be provided to assist them (Raw, McNeill, & West, 1998). A variety of services and therapies are available e.g. specialist stop smoking services, telephone help lines, counselling programmes, pharmacological products designed to aid cessation. Smoking cessation services available through primary care appear to be effective. For example, physician advice for smoking cessation versus no advice has a small significant effect on cessation rates (measured as abstinence at six months), with more intensive interventions likelier to produce better outcomes compared with minimal interventions by physicians (Stead et al., 2013). Nicotine replacement therapy (e.g. nasal spray or gum) has been found to be effective in smoking cessation compared with a placebo, increasing the rate of quitting by 50-70% and its effectiveness is largely unaffected by additional support provided to the individual (Stead, Perera, Bullen, Mant, & Lancaster, 2008). Currently, public health policies focus on preventing people from starting smoking and helping those who want to quit. However, nicotine is very addictive and some smokers will never succeed in quitting. A number of harm reduction strategies to reduce the harm from smoking involving continued use of nicotine, such as nicotine replacement or smokeless tobacco, can be implemented (RCP, 2007). Currently, there is insufficient evidence to support the long-term health benefits of the harm reduction approach, however it appears harm reduction might offer an effective precursor to quitting or safer tobacco choices for smokers (Stead & Lancaster, 2007).

VI. Tobacco regulation and monitoring

An important part of the tobacco policy is the monitoring of tobacco use and an ongoing evaluation of policies that are in place as this will help to ensure the effectiveness of other policies. According to the MPower report monitoring should include: (i) prevalence of tobacco use; (ii) impact of policy interventions; and (iii) tobacco industry actions such as

marketing, promotion and lobbying. Monitoring should provide general as well as specific information on tobacco prevalence e.g. overall level of smoking, but also levels of smoking by social class or region (World Health Organization, 2008b). Close monitoring of the tobacco industry should also be incorporated as tobacco companies have been shown to attempt to influence research and the scientific debate in order to discredit scientific evidence (Muggli, Hurt, & Blanke, 2003; Samet & Burke, 2001). As well as monitoring the effectiveness of tobacco policies, measures regulating content and sale of tobacco products such as reducing tar content or raising the age of purchasing cigarettes or prohibition of tobacco sales through vending machines could be implemented. Economic analyses predict that increasing the age of purchase of cigarettes from 18 to 21 would have no immediate effect on smoking prevalence, but would have a significant effect on adolescent smoking (15-17 years old group) and as a result would reduce adult smoking prevalence in the long term (Ahmad & Billimek, 2007).

2.2.3 Tobacco control policy in England

In England, the harm caused by tobacco was not fully recognised until 1998, when the White Paper on tobacco *Smoking Kills* (DH, 1998b) was published. In 2004, the Department of Health published the *Choosing Health: Making healthier choices easier* White Paper (DH, 2004), which built on the 1998 proposals. Between 1998 and 2009 tobacco control policy in England was largely guided by the 1998 and 2004 White Papers. However, some policies were determined by European Union legislation or WHO FCTC which was ratified by the UK in 2004 (WHO, 2013c). In 2010, the Department of Health published *A Smokefree Future* (DH, 2010b) describing the new tobacco control strategy for England which supersedes the *Smoking Kills* paper. In November 2010, a new White Paper *Healthy Lives, Healthy People* (DH, 2010a) was published setting out the government's plan for the future of public health in England. In the new vision, local health leadership would have more control and responsibility for actions aimed at improving people's health and well-being, with a new approach to tackling health inequalities. In March 2011, the Department of Health published *Healthy lives, healthy people: a tobacco control plan for England* (DH, 2011c) that set out commitments to a number of new tobacco initiatives such as a ban on the display of tobacco products in shops. Table 2.1 presents tobacco-related policies that have been implemented or will be implemented (in chronological order) in England.

Table 2.1 Tobacco control policies in England

Tobacco control policy	Year introduced
Public education- marketing and communication programmes	1998
Tar yield to no more than 12mg per cigarette from 1998 further reduced to 10mg per cigarette from 2004	1998 2004
Creation of NHS Stop Smoking Services	1999
NRT medicines become widely available	2001
Increased health warning on cigarette packs to ⅓ of the main pack faces	2002
Tobacco policy programme established for each region of England	2003
Misleading 'mild' branding banned	2003
Prohibition of most tobacco advertising and sponsorship	2003/2004
Public Service Agreements	2004
Implementation of the Quality and Outcomes Framework	2004
WHO FCTC ratified by the UK	2006
VAT on nicotine replacement therapy reduced to 5% for over the counter medicines	2007
Smokefree law in England	2007
The age of purchase of cigarettes raised from 16 to 18	2007
Picture warnings on all tobacco packaging	2008
A law to give judges the power to ban a retailer from selling tobacco if a retailer was found guilty of selling tobacco to under 18s	2008
HM Customs and UK Border Agency join forces to tackle smuggling	2008
Additional resources for the Local Authority Coordinators of Regulatory Services (LACORS)	2009
The ban on tobacco vending machines	2011
Ban on the display of tobacco products at the point of sale for larger retailers for smaller retailers	2012 2015

2.2.4 The effectiveness of tobacco control & possible improvements to UK tobacco control

Smoking Kills White Paper has set targets for reducing smoking prevalence among school pupils (aged 11-15 years), pregnant women and adults. The target set for school pupils to reduce smoking prevalence from 13% to 9% or less by 2010 (with a fall to 11% by the year 2005) was achieved as in 2009, 6% of pupils were regular smokers and this downward trend continued and 4% of pupils were smokers in 2012 (ASH, 2013). For women who smoke during pregnancy, the target was to reduce smoking prevalence from 23% to 15% by the year 2010 with a fall to 18% by the year 2005; this target was achieved as the results of the 2005 Infant Feeding Survey indicate that 17% of mothers continued to smoke throughout their pregnancy (Bolling, Grant, Hamlyn, & Thornton, 2007), while in 2010 this

percentage fell to 12% (McAndrew et al., 2012). For adults, a target to reduce smoking prevalence from 28% to 24% or less by 2010 with a fall to 26% by the year 2005 was set and was met as adult smoking rates fell to 26% in 2005 and to 21% in 2008, thus both targets had been met (ONS, 2010).

Tobacco control policy in the UK currently costs around £300 million per year. If we assume that the seven percent drop in smoking prevalence between 1998 and 2008 was achieved solely by tobacco control policies, tobacco control policies appear to be extremely cost-effective as they delivered net revenue benefits of £1.7 billion per year (ASH, 2010). Apart from revenue benefits, the comprehensive strategy had a positive societal impact – the number of child smokers was reduced by half and smoking among adults declined by 7%. A big part of the control policy budget is spent on the NHS smoking cessation services. A systematic review by Bauld et al. (2010) concluded that those services are cost effective and effective in helping smokers to quit in the short and longer term, with the 4 week quit rate of 53% and 1 year quit rate of 15%- which is comparable to the effectiveness of high intensity smoking cessation trials. What is more, services were effective in reaching smokers from disadvantaged communities (Chesterman, Judge, Bauld, & Ferguson, 2005), however those from the lowest SES groups were found to be half as likely to become ex-smokers compared with those from the highest SES groups (Kotz & West, 2009). What is more, currently only 5% of those trying to quit smoking use those services (ASH. 2010). Therefore although those services appear to be effective and cost-effective they are under-used.

In 2010, Joosens and Raw conducted a survey of tobacco control activity among 31 European countries to measure the implementation of tobacco control policies at country level (Joossens & Raw, 2011). The UK was rated top across European countries and was named a leader in tobacco control as all six policy strands recommended by the World Bank had been implemented (tax measures; smoke-free legislation; public information campaigns; comprehensive ban on advertising and promotion; large health warnings, cessation services). However, further measures could be introduced. Tobacco advertisement and sponsorship were banned in the UK in 2003/2004; however, a marketing tool is still available for tobacco companies to advertise their products in the form of packaging (Wakefield, Morley, Horan, & Cummings, 2002). Although the use of misleading terms such as ‘mild’ or ‘light’ is prohibited, tobacco manufacturers have moved to using colours to indicate ‘the strength’ of cigarettes (Borland et al., 2008). A possible solution to this problem could be plain packaging (a plain white pack, with standardised font, size, opening etc.). Plain packaging has been found to be effective in contributing to a decrease

in tobacco consumption (Cunningham & Kyle, 1995; Freeman, Chapman, & Rimmer, 2008). In addition, health warnings included on plain packaging achieved a significantly greater recall rate compared with branded products (Beede & Lawson, 1992). In terms of smoking cessation and harm reduction, a number of other strategies could be implemented to help smokers quit or lower the health risks associated with using nicotine such as allowing dentists to prescribe nicotine replacement therapy 2010). Another important step in tobacco control which aims to create "a smokefree future" (DH, 2010b) is denormalisation of smoking which aims to reframe it into an undesirable behaviour.

Denormalisation of smoking

The implementation of a comprehensive tobacco control policy not only aims to reduce exposure to second hand smoke, encourage quitting and prevent smoking uptake, but also to denormalise tobacco. Tobacco denormalisation can be described as "all the programs and actions undertaken to reinforce the fact that tobacco use is not a mainstream or normal activity in our society" (Lavack, 1999, p. 82) and it includes: social denormalisation of smoking (strategies which limit where smoking may occur for example by the introduction of the smoke-free law or how tobacco products are sold- e.g. plain packaging and ban on tobacco display); and tobacco industry denormalisation (strategies to expose industry manipulative tactics and to raise people's awareness about tobacco industry responsibility for smoking-related disease, and this can be achieved by the use of mass media campaigns) (Kushnir, Selby, & Cunningham, 2013).

This coordinated approach which employs a number of strategies has been found to be effective in reducing smoking prevalence (Kim & Shanahan, 2003; Hammond et al., 2006; Alamar & Glantz, 2006). For example, a longitudinal survey of 9058 smokers from four countries (UK, US, Canada and Australia) demonstrated that social denormalisation of smoking is associated with cessation behaviour (Hammond et al., 2006). Although there were country-level differences in denormalisation beliefs with Canadian smokers reporting the greatest denormalistion and UK smokers the least, smokers with high denormalisation beliefs had higher intention to quit and were more likely to intend to quit compared with those reporting low denormalisation beliefs. Social denormalisation of tobacco was associated with increased exposure to tobacco control and social denormalisation beliefs were higher among smokers living in countries with more comprehensive tobacco control policies. However, the association between denormalisation and tobacco control is likely to be reciprocal, where comprehensive tobacco control helps to shape anti-smoking attitudes, while anti-smoking attitudes provide a supportive environment for the introduction of policy changes (Hammond et al., 2006).

Although approaches that aim to denormalise smoking appear to have a significant impact on smoking behaviour, such approaches employ the use of stigma as a public health tool and this is in contrast to approaches which aim to address other dependence such as alcohol or illicit drugs where de-stigmatisation has been argued to lessen the barriers to seeking help (Bell, Salmon, Bowers, Bell, & McCullough, 2010). However it appears that the use of stigma in the tobacco control might be more justifiable as firstly the use of stigma approach is only temporary and it aims to shift ‘‘pathogenic’’ patterns of behaviour (Bayer, 2008) and secondly as smoking is an environmental health issue where smoking is seen as undesirable by non-smokers as they are exposed to second hand smoke which is harmful to their health (Bayer & Colgrove, 2004).

2.2.5 Important differences between smoking and behaviours associated with obesity

In order to conduct a realistic exploration of the potential for translation of strategies found to be successful in reducing smoking prevalence in the UK to tackling obesity, the important differences between smoking and behaviour associated with obesity (i.e. physical activity and eating behaviours) should be acknowledged. A summary of these similarities and differences is presented in Appendix 2.1 and 2.2.

2.3 Section 3: Obesity policy

2.3.1 Rationale for introducing public health policy to tackle obesity

There is convincing evidence that increased physical activity and increased intake of dietary fibre are protective against weight gain, while sedentary lifestyle and high intake of energy-dense micronutrient-poor foods promote unhealthy weight gain (Joint WHO/FAO Expert Consultation, 2003; World Cancer Research Fund, 2007). Thus, there is a potential to prevent the growing burden of obesity through interventions targeting unhealthy diets and low levels of physical activity/ sedentary lifestyles (interventions should target both sides of this energy imbalance simultaneously) (WHO, 2004).

Individuals are not exclusively responsible for their food intake and physical activity levels because the degree to which lifestyle choices regarding diet and physical activity are freely made is limited (Nuffield Council on Bioethics, 2007). There are a number of agents that influence people’s lifestyles such as urban planning policies which may encourage or discourage walking or cycling or local supermarkets which might influence the availability of fresh fruit. Socialization and social construction are involved in acquiring and maintaining

personal lifestyle, and the possibility to change it is often heavily constrained by a range of socioeconomic factors (Holm, 2007; Nuffield Council on Bioethics, 2007). What is more, human studies have shown that drugs and food activate similar common reward circuitry in the brain and that both drug addiction and obesity involve learned habits and preferences. These habits and preferences are reinforced by powerful and repetitive rewards, suggesting that individuals might find it difficult to control their eating or be vulnerable to developing a food addiction (Adam & Epel, 2007; Kalra & Kalra, 2004; Volkow & Wise, 2005). Finally, people often fail to make healthy choices, as individuals rarely have full information about their own health or receive conflicting health advice (e.g. many different diets to lose weight); people may also differ in their ability to understand the consequences of their actions and might not fully appraise long term health consequences of for example eating a diet high in saturated fat (Wanless, 2004).

Therefore, the state has a role to play in helping individuals to lead a healthy lifestyle (World Health Organization, 2004) and this can be facilitated by the introduction of public health policies which are defined as *"*decisions, plans, and actions that are undertaken to achieve specific health care goals within a society" (World Health Organization, 2013b). Obesity policies that can be introduced can vary in the degree to which personal responsibility and freedom will be affected. This is known as an intervention ladder (Nuffield Council on Bioethics, 2007) and is presented in Table 2.2.

Table 2.2 Intervention ladder, adapted from Nuffield Council on Bioethics

Intervention type	Explanation	Example
Eliminate choice	Introduce regulation to eliminate choice	Ban production and import of junk food
Restrict choice	Introduce regulation with the aim of protecting people	Remove unhealthy ingredients from food
Guide choice by disincentives	Introduce fiscal and other disincentives to influence people's choice (discourage people from pursuing certain behaviours/activities)	Impose an additional tax on junk food
Guide choice by incentives	Introduce fiscal and other incentives to influence people's choice (encourage people to pursue certain behaviours/activities)	Subsidize bicycles that are used as a means of transport to work
Guide choice by changing the default policy	Introduce policies that aim to change default option for a more healthy option where possible	Restaurants could serve rice as a default option instead of serving chips
Enable choice	Enable participation in healthy activities (offer people choice)	Building cycling lanes or providing healthy options in work cafeterias
Provide information	Educate the public	Introduce a mass media campaign about the link between abdominal obesity and type II diabetes
Do nothing	Do nothing or monitor current situation	Do nothing

The introduction of obesity policies gives rise to ethical concerns, most importantly whether the state can intervene to promote a person's own health or well-being and whether it is justifiable to make a decision on a person's behalf to restrict their choice to promote an aspect of their physical health that the government or the health service value, regardless of whether this is something the given individual values. Although the notion of individual choice, responsibility and autonomy might not be justified in the case of obesity, it is argued that the obesity policy should not constrain personal choice as a third party cannot objectively decide if an individual would have a better quality of life if they ate more fibre and exercised more (Holm, 2007). The Nuffield Council on Bioethics, an independent body that examines and reports on ethical issues in biology and medicine, in a report on ethical

issues in public health recommends a 'stewardship model', where the state should not restrict people's freedom, but at the same time should provide conditions under which people can lead healthy lives if they wish (Nuffield Council on Bioethics, 2007). Under this model, particular attention should be paid to vulnerable groups such as children and the health strategies should: promote healthy living through enabling choice and behaviour change initiatives (e.g. by building cycling lanes or introducing nutrition education at schools), eliminate or reduce health inequalities (e.g. fruit vouchers for low SES people), protect vulnerable groups (e.g. promotion of healthy eating at schools) and aim to protect others from harm (e.g. action taken by social services in case of severely overfed children). This approach agrees with the main statement of the *Ottawa Charter for Health Promotion* that "healthy choices need to be the easy choices" (World Health Organization, 1986) where health promotion is seen as government, public and private sectors working together to enable all people to achieve their fullest health potential. However, a call for action on obesity can have a number of negative consequences such as stigmatisation of obese people, people starting to worry about their body weight and transforming healthy individuals into 'patients' suffering from a disease (de Vries, 2007).

2.3.2 Level at which policies can have an effect

Obesity is not a behaviour per se, it is a consequence of behaviour (consuming too much energy and expending too few calories through physical activity). Therefore, to address obesity the government is seeking to influence human behaviours associated with food consumption and physical activity. The government may seek four types of behaviour change: to adopt a new behaviour (e.g. start engaging in regular leisure time physical activity); to stop doing something damaging (e.g. stop adding salt at the table); to prevent the adoption of a negative behaviour (e.g. to prevent formation of an unhealthy eating habit); to modify existing behaviour (e.g. increase the number of portions of fruit and vegetables a day) (Governmnet Communication Network, 2009). In order to achieve these behaviour changes, citizens might be encouraged or asked to act in one or more of the following ways: stop doing something they find pleasurable (e.g. stop eating chocolate); change their habits or use less convenient ways of doing things (e.g. walk instead of drive to work); confront their peers (e.g. decline a dessert); hear bad news (e.g. type II diabetes diagnosis); be embarrassed (e.g. go swimming); learn a new skill (e.g. learn how to cook); do something for where there is little benefit at an individual level (Australian Public Service Comission, 2007).

The government may achieve these changes by targeting factors that influence human behaviour on three levels: personal, interpersonal/social and environmental factors (Governmnet Communication Network, 2009). Personal or 'micro' factors encompass factors which are intrinsic to the individual and that influence processes involved in individuals' decision-making (both reflective and impulsive). This group includes factors such as self-efficacy, knowledge, awareness, attitudes, habit and routine, emotions, biases and heuristics. Interpersonal level or social factors are factors concerned with how other people influence the behaviour of an individual and how individuals relate to each other and include factors such as social norms. Environmental factors include social, financial and environmental factors shaping human behaviour (e.g. economy or technology). Policies that are developed to address obesity can target factors from one level or different levels (NICE, 2007).

2.3.3 Obesity policy challenges

Determining the causes of obesity is central to tackling it, however the causes of obesity are complex and not entirely understood and the relative importance of diet and physical activity remains unclear. Therefore, even though the policy should be evidence-based, there is no time to wait for the evidence as the obesity epidemic is spreading at an alarming rate (WHO, 2011). There are numerous influences on obesity which operate at many levels and effective obesity policy should recognise this complexity (House of Commons Health Committee, 2004). As to policy formulation and implementation, the day-by-day 'invisibility' of the causes (Wansink & Huckabee, 2005) and no instant feedback loop between behaviour and its consequence creates difficulties with solutions to the obesity as people might think e.g. that just another biscuit would not make a difference (Tapp, Eagle, & Spotswood, 2008). What is more, as health promotion should include actions from the government and public and private sectors, effective obesity policy formulation and implementation requires many agencies/bodies to be involved (McKinnon et al., 2009). Key partners to collaborate on designing, conducting, and applying obesity policy research are presented in Appendix 2.3.

Policy evaluation requires valid and reliable measures (McKinnon et al., 2009) and the WHO recommends that policy outcomes should be evaluated at three levels: a) psychosocial changes- such as an increase in nutritional knowledge or attitude to healthy eating; b) behavioural changes- e.g. increase in physical activity levels; c) physical and clinical changes such as changes in BMI or blood pressure (WHO, 2009b). Policy makers also

need to decide whether to focus on obesity prevention (avoidance of weight gain among healthy weight children and adults and stabilisation of weight among those who are already overweight or obese), treatment or to implement both these approaches. Research evidence suggests that an obesity policy should be comprehensive and include both prevention and treatment (Kumanyika et al., 2008); however, the major focus should be placed on prevention rather than treatment as treatment alone cannot reverse the growing obesity epidemic and the ability of the health services is limited in terms of the number of obese people they can treat (Kumanyika et al., 2008). A benefit of the prevention approach is also the fact that it is highly relevant to obesity treatment as it conveys the message about healthy lifestyle and may also contribute to forming a social environment that is helpful to obesity reduction (Kumanyika et al., 2008).

Similarly, policy makers need to decide whether to take a whole population approach or target those at higher obesity risk such as pregnant women. There is growing evidence that the whole population approach may be more effective than targeting those at risk as it is effective both in improving population health and in reducing health inequalities (Capewell & Graham, 2010)- as reducing health inequalities is one of the aims of public health policies (Royal College of Nursing, 2012). However, not all types of population-wide approaches are effective in reducing health inequalities. Interventions whose success relies on active engagement of individuals (for example nutritional labelling or anti-smoking campaigns) may in fact increase health inequalities as more advantaged groups are more likely to engage with these opportunities. In contrast, policies that address structural changes such as the smoke-free legislation might reduce health inequalities (Nuffield Council on Bioethics, 2007). In addition, although population-based approaches can translate into substantial reductions in deaths, they tend to bring little benefit to the individual (Swinburn & Egger, 2002). For example, by extending value added tax to the main sources of dietary saturated fat it is estimated that each year around 900-1200 lives would be saved. However, this dietary-based tax would not bring any benefit to the individual and it is likely that individuals might have to pay more for some products (Marshall, 1999). In contrast, targeting those at risk may provide significant benefits to the individuals and might be more cost effective compared with a population-wide approach (Holm, 2007), but have little impact on population disease burdens or health inequalities as it only changes risk factors on a person-by-person basis (Swinburn & Egger, 2002).

2.3.4 Key obesity prevention guidelines from international organisations

Tackling the obesity epidemic is an important focus for many international organisations. During the 57th World Health Assembly (WHA) in May 2004, the World Health Organisation adopted the *WHO Global Strategy on Diet, Physical Activity and Health* (WHO, 2004). In 2008, building on the *WHO Framework Convention on Tobacco Control* and the *WHO Global Strategy on Diet, Physical Activity and Health*, the WHO published *2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases* (WHO, 2008a), a plan of action to prevent and control four of the world's biggest killers (cardiovascular diseases, diabetes, cancers and chronic respiratory diseases) and four shared risk factors (tobacco, unhealthy diet, physical inactivity and alcohol use). The European Union (EU) also recognises the importance of tackling the obesity epidemic. In 2005, an EU Green Paper *Promoting Healthy Diets and Physical Activity: a European Dimension for the Prevention of Overweight, Obesity and Chronic Diseases* was published, to stimulate discussion and launch a process of consultation to devise and implement initiatives aimed at promoting healthy diets and physical activity. It called for the development of strategies that could be implemented by a number of stakeholders at local, regional, national and European levels (Commission of the European Communities, 2005). The EU considers the effective partnership between a broad range of EU partners (organisations ranging from food industry to consumer protection NGOs) as key to containing or reversing current obesity trends. Therefore in 2005, the *EU Platform for Action on Diet, Physical Activity and Health* was created (European Commission, 2005). This platform aims "to catalyse voluntary action across the EU by business, civil society and the public sector" (Commission of the European Communities, 2005). In 2007, building on the *EU Platform for Action on Diet, Physical Activity and Health* and the green paper, the European Union published a white paper *A Strategy for Europe on Nutrition, Overweight and Obesity Related Health Issues*, setting out an integrated EU approach to contribute to reducing ill health due to obesity (Commission of the European Communities, 2007).

2.4 Section 4: Public health policy to tackle obesity in England

2.4.1 Development of obesity policy in England

2.4.1.1 Public health policy

For the first time obesity was recognised as a public health concern in the 1992 *Health of the Nation* white paper. A wide-ranging strategy was launched which aimed to achieve better health in England by targeting five key areas: cardiovascular disease, cancers, mental illness, accidents and HIV/AIDS and sexual health. Obesity was recognised as one of the main risk factors for cardiovascular disease and a target to reduce its prevalence was set (to reduce the number of obese [BMI >30] women aged 16-64 years by at least 33% [from 12% in 1986-1987 to 8% in 2005] and among men by at least 25% [from 8% to 6%]). Additionally, two diet-related targets were set: to reduce the average percentage of food energy derived from saturated fatty acids by at least 35% by 2005 (from 17% in 1990 to no more than 11%) and to reduce the average percentage of food energy derived from total fat by at least 12% by 2005 (from about 40% in 1990 to no more than 35%) (DH, 1992).

The *Health of the Nation* white paper emphasized the importance of individual behaviour change and informed choice. To help coordinate initiatives and to help achieve its targets, the Nutrition Task Force was established in October 1992 (Wells, 1994). In March 1994, the Nutrition Task Force published an action plan *Eat Well*, which was intended to help consumers select a healthier diet (DH, 1996). Although the *Health of The Nation* white paper was at first welcomed (Holland & Stewart, 1998), an independent review panel judged the strategy's five year lifespan as a failure. It was criticised on several grounds: its impact on policy-making was minimal while other things such as reducing hospital waiting lists took priority; it lacked cross-departmental commitment even though horizontal and vertical ownership was stressed as a priority; it did not seriously impact the local level health service and health authorities did not re-adjust its investment priorities (DH, 1998a). Other criticisms relating to the *Health of the Nation* included: neglecting the environmental and socio-economic determinants of health, focusing on disease models and disease reduction targets, failing to appreciate the role of local authorities, focusing on the individual and their role in health, rather than on community, equity and environmental protection (Holland & Stewart, 1998).

Building on and extending the *Health of the Nation*, in 1999 the Department of Health published a new public health strategy- *Saving Lives: our Healthier Nation* (DH, 1999). This new white paper focused on four main priority areas of ill health and premature death: coronary heart disease (CHD) and stroke, cancer, accidents and mental illness. Although

no specific objectives or targets were set regarding obesity prevalence, obesity was recognised as an important risk factor for CHD, stroke and some cancers. A target to reduce the number of CHD and stroke deaths in people under 75 by at least two fifths by the year 2010 was set. The white paper was accompanied by the *National Service Framework for Coronary Heart Disease* (DH, 2000a); a ten year strategy to transform the prevention, diagnosis, treatment and care of patients with heart disease. NHS Trusts and Primacy Care Groups were to contribute to the delivery of the local programme of effective policies for reducing obesity. Further plans to tackle obesity and physical inactivity were announced in *The NHS Plan: A Plan for Investment, A Plan for Reform* (DH, 2000b) outlining the new vision of a health service designed around the patient. Proposals to improve diet and nutrition by increasing fruit and vegetable consumption and reducing salt, fat and sugar intake were made.

In 2002, the Chief Medical Officer, in his annual report, recognised childhood obesity as the main concern for the future health of the nation, characterising it as a “time bomb” (DH & Chief Medical Officer, 2003). The high health and societal costs associated with obesity were also acknowledged in a report *Securing good health for the whole population* prepared by Derek Wanless for the HM Treasury. The report predicted a significant increase in the healthcare costs associated with obesity. Assessing current obesity strategy, the report suggested the 1992 obesity target set in the *Heath of the Nation* and the 2002 physical activity target set in the *Game plan* seem highly aspirational and that they should be reassessed and new, more realistic targets for 2007 and 2011 be set. The report outlined the benefits for health of a “fully engaged society” and emphasized that a dramatic change is needed in the way health issues are addressed, with new thinking and practical action (Wanless, 2004). Three months after the publication of the Wanless report, in May 2004, the Health Select Committee of the House of Commons published a report on obesity (House of Commons Health Committee, 2004) which made a number of recommendations for the government on addressing obesity and physical inactivity. The recommendations provoked a government response in the form of a new white paper *Choosing Health: Making Healthy Choices Easier* (DH, 2004). As the title implied, personal responsibility was to be the main drive of healthy behaviours, while the role of the government was to support people in making healthy choices if they wish. The three core principles of the new strategy were: informed choice, personalisation and working together. Two of the six overarching priorities were to reduce obesity and improve diet and nutrition and to increase exercise, thus this was the first white paper published by the UK government that identified obesity and physical inactivity as one of its main concerns. A target to halt the year-on-year increase in obesity among children under 11 by the year 2010 was set. In 2005, to meet the targets set,

a new cross-government strategy *Delivering choosing health: making healthier choices easier* was announced (DH, 2005). Proposals of a number of new initiatives aiming at tackling obesity and physical inactivity were made such as introducing a new cross-government campaign on obesity; introducing food labelling developed together with the industry by 2006; improving access to physical activity (e.g. support for cycling) or restricting advertising of unhealthy foods to children. The next steps of the strategy announced in the *Choosing Health: making healthy choices easier* were set out in *The Health Challenge England: Next Steps for Choosing Health* (DH, 2006) published in 2006. The strategy again emphasized individual choice and responsibility for individual health.

In 2007, Foresight, the government scientific think tank that aims to inform future government strategies, policies and priorities based on science and technology, published results of a review on obesity- *Tackling Obesities: Future Choices* (Foresight, 2007). The report emphasized that determinants of obesity are complex; obesity is not an individual choice, but is in most cases the result of the exposure to the obesogenic environment and suggested that a cross-cutting, comprehensive, long-term strategy that involves multiple stakeholders with a heavy focus on obesity prevention is needed to tackle obesity. The Foresight report also acknowledged that the obesity challenge requires a policy paradigm shift- from a focus on individual choice and responsibility to reshaping the wider environment (for example by changing public policy regarding food manufacturing) (Foresight, 2007).

In 2008, the new government health strategy *Healthy Weight, Healthy Lives- a cross-government strategy for England* (DH, 2008a) was announced and although the complex determinants of obesity and the need to tackle the environment emphasized by Foresight were recognised, the strategy still strongly emphasized individual choice and responsibility. The government abandoned the 2004 target to halt the year on year obesity increase among children under 11 by 2011 and announced a new plan: the UK will be the first nation to reverse the rising obesity trend. The new target was to reduce the prevalence of childhood obesity in childhood to 2000 levels by 2020. To fulfil this plan, the action will be focused on five main policy areas: promoting children's health (e.g. by a Child Measurement Programme; develop healthy lunch box policies; develop tailored PE programmes in schools); promoting healthy food (e.g. bring forward the review of advertising restrictions); building physical activity into people's daily lives (e.g. *Walking into Health* campaign); supporting health at work and providing incentives to promote health (launch a number of pilots of well-being assessments); providing effective treatment and support for overweight

and obese people (develop the NHS Choices website giving highly personalised advice to all on their diet and activity levels).

In May 2010, a Conservative and Liberal Democrat coalition formed a new government in England and there has been a change in ideology to focus on non-regulatory behaviour change interventions. In the foreword to the new coalition programme David Cameron and Nick Clegg wrote “there has been the assumption that central government can only change people’s behaviour through rules and regulations. Our government will be a much smarter one (…) finding intelligent ways to encourage, support and enable people to make better choices for themselves” (HM Government, 2010, p.8). The new coalition government has argued that non-regulatory and non-fiscal measures respect the freedom of the individual more compared with the regulatory measures and that measures should be implemented in partnership with commercial and voluntary organisations (HM Government, 2010). In 2010, the Department of Health, published a new white paper *Healthy Lives, Healthy People: our Strategy for Public Health in England* (DH, 2010a), setting out a new approach that “empowers individuals to make healthy choices and gives communities the tools to address their own, particular needs” (p.2). Obesity was recognised as a serious health problem and the impact of health inequalities on obesity was also acknowledged. A series of initiatives was announced such as establishing a new public health service - Public Health England - that will replace the existing structures (including Health Protection Agency), working together with the business and voluntary sector and introducing better information for consumers about food.

However, in 2011 the behaviour change report published by the Science and Technology committee criticised the coalition government for over-reliance on the non-regulatory and non-fiscal measures (so called ‘nudges’) for which the cost-effectiveness evidence is lacking. The available evidence also suggests that non-regulatory measures are not likely to be effective in isolation and that a comprehensive set of strategies should be implemented. The report argued that a distinction should be made between individual and business freedom and that the regulation of the business might increase the freedom of an individual (by for example banning exclusive school deals such as Coca Cola to give pupils choice). Devolving responsibility for behaviour intervention to the local authorities has also been criticised mainly because local authorities might not have the range of skills required to interpret available evidence, design and implement interventions, or evaluate them (House of Lords Science and Technology Select Committee, 2011).

On 13th October 2011, the Department of Health published a new governmental obesity strategy *Healthy Lives, Healthy People: A Call to Action on Obesity in England* (DH, 2011b) setting out a new approach for effective action on obesity. The document emphasized that individuals are ultimately responsible for their health and that they should be free to make physical activity and dietary choices. The government's responsibility lies in creating environments that promote healthy choices and providing information about healthy choices and support for healthy living. It emphasized that past approaches have not been successful in addressing the obesity problem and a new approach is needed. Two new targets were set: a sustained downward trend in the level of excess weight in children by 2020 and a downward trend in the level of excess weight averaged across all adults by 2020. The main components of this new approach will include: empowering individuals through guidance, information, encouragement and support to equip them to make the best possible choices for themselves rather than restricting choices (thus this approach favours less intrusive measures of the Nuffield ladder of interventions); developing a greater role for business through for example the Responsibility Deal; giving local government the lead (strategies will be developed and implemented at a local level to address different community characteristics) and developing further the evidence base on what works in addressing obesity, therefore it appears that this new strategy ignored some of the recommendations from the Science and Technology committee report (House of Lords Science and Technology Select Committee, 2011).

2.4.1.2 Transport and sport policy

Obesity is beginning to be considered more than a health service issue and other government departments are introducing policies that aim to address obesity and physical inactivity. To date, the Department for Transport has published three white papers addressing physical inactivity. The 1998 white paper *A new Deal for Transport: Better for Everyone* was the first white paper that made explicit links between health and transport: "The way we travel is making us a less healthy nation" (Department of the Environment, 1998, p.16). One of the frameworks set by this paper was to encourage a healthy lifestyle by reducing over-reliance on motorised transport and making it easier to walk and cycle more. Similar health concerns were raised in the 2004 white paper *The Future of Transport: a Network for 2030* (Department for Transport, 2004a). The aim set was to make walking and cycling a real alternative for local trips and this white paper was accompanied by *Walking and Cycling: an Action Plan* (Department for Transport, 2004b) setting out measures to support and encourage more walking and cycling. In January 2011, a new white paper *Creating Growth, Cutting Carbon – Making Sustainable Local Transport*

Happen (Department for Transport, 2011), was published, setting out the vision for a sustainable local transport system that supports the economy and reduces carbon emissions. The paper noted that two-thirds of all journeys in the UK are under 5 miles and it would be beneficial for both economic and health reasons if the majority of those trips were walked, cycled or undertaken using public transport. The strategy set aimed to offer people choices that will deliver a shift in behaviour from using own car transport to travelling on foot, by bike or on public transport.

The department for Culture, Media and Sport (DCMS) is currently responsible for policies related to physical activity, sports promotion, television regulation and advertising. In 2000, a new sports strategy *A Sporting Future for All* was announced (DCMS, 2000) and strategies such as more funding for primary schools to provide facilities for pupils and the wider community and the development of more after-school sport provision were announced. In 2002, the policy document *Game Plan* (DCMS, 2002) was published setting out the plan for provision and delivery of sport and physical activity. This document emphasized significant health benefits and the need to reduce the growing costs of inactivity. One of the two overarching objectives was a major increase in participation in sport and physical activity by 2020 (70% of the population to be reasonably active by 2020). The physical activity policy was changed in 2008 with the publication of the *Playing to Win: a New Era for Sport* white paper (DCMS, 2008). The new policy "seeks to change the culture of sport in England" (p.2) with the main aim for the UK to become a truly world leading sporting nation. Some of the targets were to engage a million more people in regular sport participation or to introduce 5 hours of physical education and sport each week to 5-16 year olds by 2017. Therefore policies that address physical inactivity in England that has been introduced up to date tend to focus on physical activity in schools, sports participation and active travel. Although there has been some increase in active travel, approximately only half of the adult population adheres to the recommended amount of physical activity each week (Jebb, Aveyard & Hawkes, 2013).

2.4.2 Obesity policy strands, their effectiveness and implementation in the UK

Below a classification of obesity policy strands is presented. This classification has been suggested by Yach et al. (2003) (based on the WHO FCTC Framework) and one proposed by Mercer et al. (2003) which was based on the tobacco strategies outlined in the Surgeon General's report *Reducing Tobacco Use* (Surgeon General, 2000). Each section will discuss a single policy strand, discuss its effectiveness and report whether it has been

introduced in the UK and whether evidence from tobacco control can help with understanding its success or failure.

I. Information and health promotion interventions

Examples of information and health promotion interventions include: warning about the dangers of obesity and benefits of healthy weight and exercising via public health campaigns; school-based interventions increasing healthy food promotion or introducing cooking classes; increasing nutritional knowledge. The advantage of mass media campaigns lies in their ability to reach large audiences with behaviourally focused messages at a low cost (Wakefield, Loken, & Hornik, 2010). Campaigns promoting healthier nutrition and physical activity are successful in achieving short term changes, mainly among highly motivated individuals, and these changes are difficult to maintain once the mass media campaign ends (Cavill & Bauman, 2004; Finlay & Faulkner, 2005; Norman et al., 2007; Pomerleau, Lock, Knai, & McKee, 2005). Mass media campaigns that promote increases in fruit and vegetable consumption or low fat milk tend to be more effective for people with health disorders for whom introducing these changes would be particularly beneficial (e.g. people with heart disease) and when these interventions are coupled with increased access to healthy foods (Brownson, Haire-Joshu, & Luke, 2006; Snyder et al., 2004). However, the impact of mass media obesity campaigns can be reduced as they have to compete with persuasive marketing of unhealthy products and powerful social norms. The effect of mass media campaigns is difficult to isolate as the majority of campaigns that employ mass media use other components such as clinical or institutional outreach (Wakefield et al., 2010).

Evidence suggests that eating and physical activity patterns are formed early in childhood, therefore school-based programmes, that focus on healthy diet and active lifestyle, might represent a successful obesity control policy (Mercer et al., 2003). Targeting the school food environment is an effective strategy to encourage healthy choices by students, but is not effective in preventing weight gain (Knai, Pomerleau, Lock, & McKee, 2006; Priest, Armstrong, Doyle, & Waters, 2008; Stone, McKenzie, Welk, & Booth, 1998; Summerbell et al., 2005). One reason why the school-based interventions are not effective is that they are not addressing all organisational and school environmental factors such as availability of vending machines or because children eat more often at home than in school. Another health promotion approach is implementing worksite interventions, however relatively little is known about the effects of those interventions on diet and physical activity outcomes among adults (McKinnon et al., 2009). They appear to be an insufficient motivating force for people to change behaviours, especially for low-income groups who tend to live in more

obesogenic environments (compared with people with higher income) (Swinburn & Egger, 2002). A systematic review of the effectiveness of worksite nutrition and physical activity programs delivered at a workplace was conducted by Anderson et al. (2009). It included 47 studies published between 1983 and 2005 and found evidence of a modest reduction in weight (a net loss of 2.8 pounds at 6-12 month follow-up). However, many studies included in the review were of fair quality, and in particular earlier interventions relied on self-reported data and lacked follow-up outcomes therefore it is not known whether the positive effects were maintained.

In addition, as these interventions from the review of Anderson et al. included many components, and 57% of the interventions focused both on improving diet and increasing levels of physical activity, conclusions regarding which program component or intervention focus (nutrition or physical activity or both) was responsible for the weight reduction could not be reached and more research to identify the active ingredients in complex interventions is needed (Craig et al., 2013). Many studies included measured primary outcomes that are not behaviours; for example, using BMI as a primary outcome for a healthy eating intervention rather than change in dietary behaviour. This is problematic as changes in BMI are not direct effects of the intervention (the direct effect would be a change in dietary behaviour). What is more, worksite nutrition and physical activity interventions tend to report baseline and outcome measures for each participant and this type of measurement does not allow to specify for which employee population such approaches are most effective. Many of the studies included also reported mean weight change of the population, therefore it is not possible to quantify intervention effect (i.e. how many individuals benefited from the intervention). A more useful measure would be reporting how many participants have lost >5% or >10% body weight.

In England, a number of information and health promotion interventions have been introduced in the recent years. The NHS Plan (DH, 2000b) announced the introduction of the *National School Fruit and Vegetable Scheme* and *5 a Day* community initiative as part of the *5 a Day Programme*. According to the *School Fruit and Vegetable Scheme*, by 2004 every child in nursery and infant school would be entitled to a free piece of fruit each school day. An evaluation of this programme was undertaken in 2008, using *The Child and Dietary Evaluation Tool*, which records child dietary intake over a 24-hour period. Children who were recipients of the scheme ate more fruit and vegetables compared with those who did not; however, the effects of this intervention were not translated into increased consumption of fruit and vegetables in the home environment (National Foundation for Educational Research & University of Leeds, 2010). Targeting adults' fruit and vegetables consumption,

the *5 a Day* community initiative was delivered through Primary Care Trusts over two years with the trusts working within the local community on a number of local initiatives such as voucher schemes, growing vegetables and cookery lessons and home delivery services. Data were collected before and after the intervention to measure changes in awareness, consumption and access to fruit and vegetables. Recipients of the programme increased their consumption of fruit and vegetables from 3.36 to 3.64 portions per day (the control area increased from 3.49 to 3.64); therefore, there was no significant difference between the two groups. However, the programme was successful in achieving larger increases in the most disadvantaged areas. Knowledge regarding the recommended levels of consumption increased significantly, but factors affecting consumption such as access or quality of product being offered were not changed (TNS Social, 2006).

II. Price and tax measures

Economic theory postulates that human behaviour can be influenced by the introduction of fiscal measures therefore there is a potential to address eating and physical activity habits by the introduction of tax on unhealthy food, providing subsidies for healthy food, higher life/health insurance for overweight/obese, and tax breaks for employers with exercise facilities (Mercer et al., 2005). 'Junk food taxes' could be adopted for the three following purposes: to diminish the consumption of unhealthy food and drink; to encourage healthier eating; to motivate manufacturers to produce healthier foods (Caraher & Cowburn, 2005). The evidence suggests that for food taxes to be effective and result in a change in consumers' behaviour, they may need to equal 10-30% of the price of the product (Kuchler, Tegene, & Harris, 2004). The tax revenue raised could fund healthcare or anti-obesity campaigns or could be used to subsidise the prices of healthy products such as vegetables (Engelhard et al., 2009). Tax could possibly change the patterns of consumption, but it does not automatically mean that the alternatives people select are going to be healthy (consumer preferences from unhealthy to healthy foods should be changed).

A number of countries have introduced the 'fat tax' (e.g. Denmark, France), however no data on the effects of these taxes is yet available (Mytton, Clarke, & Rayner, 2012). Randomised controlled trials suggest that taxation is an effective strategy for changing consumption patterns (Block, Chandra, McManus, & Willett, 2010; Epstein et al., 2012), and for example a 35% price increase on regular soft drinks in a hospital environment resulted in a 26% decline in sales of soft drinks during the price increase phase. Modelling studies estimate that in the UK a 20% tax on sugary drinks (which accounts for 18% of energy per day for adults) would result in a daily reduction in energy consumption of 12-29 kJ per day

(Ng, Ni Mhurchu, Jebb, & Popkin, 2012). A different modelling study suggested that a 20% tax on sugar sweetened drinks introduced in the UK would reduce consumption of concentrated sugar sweetened drinks by 15% and non-concentrated sugar sweetened drinks by 16%, and would reduce the number of obese adults by 180 000 (1.3%) and the number of overweight adults by 285 000 (0.9%) (Briggs et al., 2013). This tax would have different effects by income (1.3% reduction in obesity for the lowest income and 2.1% in the highest income) and would decline with age (most effective for people under 30 years). Therefore 'junk food taxes' might produce significant changes in BMI or obesity prevalence; however, if the tax is implemented as a stand- alone policy, it is likely to fail in counteracting obesity and it should form part of a wider initiative (e.g. restrictions on advertising) (Caraher & Cowburn, 2005).

There are a number of difficulties and challenges associated with the introduction of the 'junk food tax'. The introduction of a junk food tax would require a definition of junk food - a product that increases obesity and has little or no nutritional content (Engelhard et al., 2009). A fat tax would disproportionally affect people with lower income, resulting in a widening of the health inequality gap (Powell & Chaloupka, 2009). The implementation of food taxation is likely to be opposed by the general public, industry, and special-interest groups (Caraher & Cowburn, 2005). Food taxation does not appear to be an effective method of food industry regulation as the aim of food industries is to make as much money as possible and not to make people obese; and the food industry is likely to respond to increased taxation by lowering the price of their products (so-called tax absorption) (Ng et al., 2012).

In England, most food products for human consumption are zero rated (0 per cent VAT); however non-essential food including alcoholic drinks, crisps and savoury snacks, confectionery, food for catering or hot takeaways, ice cream, soft drinks and mineral water are standard rated (20 per cent VAT). However, some of those products contain exceptions and are zero-rated. For example, not all confectionery products are standard rated e.g. shortbread partly or wholly chocolate-covered is standard rated, while a chocolate chip biscuit is zero-rated; a cereal bar with honey is standard rated while flapjacks are zero-rated (HM Revenue & Customs, 2011). No other additional fiscal measures have been introduced in England to date. Therefore, if non-essential foods are already taxed at 20 per cent, to achieve the benefits of increasing the tax, the tax that is currently applied to these products would have to be increased (as suggested by modelling studies by at least 20%).

III. Labelling

Two types of labelling could be introduced: nutritional information labelling and health warnings. The aim of introducing nutritional information labelling which informs about the food content is twofold: to help consumers make healthier dietary choices that would help to improve their health in the long-term (Lin, Lee, & Yen, 2004) and to motivate food manufacturers to improve the nutritional attributes of their food products, which in turn would increase competition between producers on the health attributes of their products (French et al., 2001). Food labelling might be especially useful for pre-packaged foods that are nutritionally complex, making it difficult for consumers to identify a product's nutritional characteristics (Lobstein, Landon, Lincoln, Ash, & Press, 2007), and in restaurants as consumers are usually unaware that food consumed outside of the home is higher in energy (Engelhard et al., 2009). Studies of food labelling have focused mostly on consumer understanding, perception, preferences/liking of food labels or use of food labels (Grunert & Wills, 2007). The results of a study by Malam et al. (2009) conducted in the UK, where 100 consumers were accompanied by the researcher while shopping and 50 bag audits were performed, indicated that food labels were not used to make healthy dietary choices. They tended to be used for three specific reasons: while trying to lose weight, when buying food for children or trying to avoid a certain nutrient because of a chronic condition like diabetes.

Food labelling helps consumers differentiate between more or less healthy food (Borgmeier & Westenhoefer, 2009; Kelly et al., 2009), with labels using graphic signs or colours being more effective than labels using text only (Campos, Doxey, & Hammond, 2011). However, the evidence regarding the effectiveness of labelling in terms of affecting the consumer's choice is limited. Although a review of 120 studies examining the impact of food labels on pre-packaged products showed that there is a link between the use of labels and healthier diets (Campos et al., 2011), the associations between label use and diet quality are mostly cross-sectional, and results suggest that people who already have healthier diets and are interested in nutritional knowledge, tend to use food labelling to guide their purchase. Similarly, introducing food labelling on restaurant menus tend to increase consumers' awareness of calorie content of their food choices, however does not appear to lead to a selection of healthier food options, especially among low income consumers (Elbel, Kersh, Brescoll, & Dixon, 2009; Gordon, & Hayes, 2012). Therefore, labelling might not be an effective strategy to motivate certain groups of consumers such as children or older obese adults to make healthier dietary choices. In addition, labelling is unlikely to change consumer behaviour as a number of factors other than food labels (e.g. hunger) might influence intentions to healthy eating and actual behaviour and healthiness of the product

might not be a main criterion in selecting a particular product (Feunekes, Gortemaker, Willems, Lion, & van den Kommer, 2008). Some researchers have suggested that labelling might be more effective if instead of focusing on the nutritional attributes of the product (e.g. this product contains 400 kcals), the label focuses on consequences of eating the product (e.g. eating this bar of chocolate is the equivalent of gaining 1/20th of a pound or the equivalent of walking 1.5 miles) (Wansink & Huckabee, 2005).

Evidence for labels as a measure for motivating the food industry to reformulate product composition or to develop new products is promising. In the UK, after the introduction of voluntary food labelling, Sainsbury's (which opted for the Traffic Light label that uses red, amber and green colour coding and text 'high/medium/low' to indicate whether product is high, medium or low in four key nutrients- fat, saturated fat, sugar and salt) reformulated some of its products' compositions to meet consumer demand for healthier products (Lobstein et al., 2007). Similar results were observed in Australia, where the introduction of the Pick the Tick Programme, resulted in significant changes in sodium levels in products that were reformulated to be able to meet the nutritional criteria for the logo. For example, the amount of salt in breakfast cereals was reduced by 378mg per 100g (61%) and in breads by 123mg per 100g (26%) (Young & Swinburn, 2002).

Another form of food labelling is warning labels, informing consumers about the negative consequences of eating a particular product in excess e.g. 'Fattening food could give you diabetes' or using aversive graphic images of the potential adverse consequences of a given behaviour. However, their impact on eating intentions and behaviour is unknown and the effectiveness of such labels has only been evaluated so far in laboratory experiments. For example, in a study by Hollands et al. (2011) participants saw a series of snack food images paired either with images of potential adverse health consequences (intervention group) or snack food images alone (control group). After watching the presentation, individuals' preference for healthy versus unhealthy foods was examined by asking participants to make two choices between fruit and snack products. Those in the intervention group were less likely to choose energy dense food. The proposed mechanism for this effect of adverse images was that images affected participants' implicit attitudes which in turn affected behaviour.

Some policy approaches have failed to live up to their potential due to opposition from food manufacturers. For example, the 2004 white paper *Choosing Health* announced work on simplified nutrition labelling and making these changes mandatory on all packaged foods. In 2006, the Food Standards Agency (FSA) announced its preferred approach to front of the pack labelling – traffic light labelling. This signposting system was supported by the

consumer and health nongovernmental organisation (NGOs), a number of major food manufacturers and retailers and some enforcement bodies. However, the vast majority of food manufacturers were opposed to the traffic light approach and adopted an alternative labelling system- the Guideline Daily Amount (GDA). The Food and Drink Federation (representatives of UK food and drink industry) argued that the GDA labelling will better help people to understand how a particular product fits into a healthy diet and it does not "demonise products that should form part of any healthy, balanced diet" (Food and Drink Federation, 2010, p.8). This coexistence of different labelling formats causes difficulties for the consumers, especially when consumers try to compare two products with different food labels. In this situation, consumers often abandon the use of labels and assess the healthiness of the product based on other factors such as the look of the product or health claim (Malam et al., 2009). Another problem with GDA food labelling is poor understanding of what percentages used on the Guideline Daily Amount (GDA) label mean. This information is especially confusing for people from a lower socioeconomic background. Many people assume that the percentages used on the GDA label indicate a percentage of the recommended daily amount, while in fact it indicates a percentage of a nutrient in the product (Malam et al., 2009). There is also evidence suggesting that information obtained from the GDA label may not be easy for people to apply to food choices (Lobstein et al., 2007).

IV. Clinical interventions and management

Clinical interventions for overweight/obesity include lifestyle interventions, pharmacological interventions and surgical interventions. Lifestyle interventions (diet and/or exercise interventions) are considered useful for moderately obese patients as a moderate weight loss (5–15% of the body weight) significantly reduces the health risks associated with excess weight (Curioni & Lourenco, 2005; Franz et al., 2007). In addition, exercise improves health by reducing cardiovascular risk factors even if no weight loss is attained (Shaw, Gennat, O'Rourke, & Del Mar, 2006). For the treatment of obesity in children and adolescents, combined behavioural lifestyle interventions produced greater reduction in weight compared to standard care or self-help (Luttikhuis et al., 2009). However, long-term weight loss after diet and/ or exercise intervention is only partially sustained, with weight regain after one year of approximately 50% across the majority of studies (Curioni & Lourenco, 2005). Weight regain is not prevented even in interventions that use therapeutic support for weight maintenance (Svetkey et al., 2008; Wing et al., 2006). For example, in a randomised controlled trial that compared leading psychological treatment of obesity (behavioural therapy) with a specific form of cognitive behaviour therapy as a treatment of

obesity, that included 155 women and lasted 44 weeks, with participants being followed for 3 years, while majority of participants lost weight, also majority regained it (Cooper et al., 2010). Therefore, once the individual becomes obese or overweight, treatment success (excluding bariatric surgery), is limited. The possible reason why lifestyle interventions appear to be unsuccessful in the long term is because sustained behaviour change depends not only on an individual's commitment, but also on support from the individual's close social networks (e.g. family members not bringing home unhealthy foods), as well as wider environment (e.g. by providing opportunities to be physically active). Therefore, comprehensive programmes that aim to address multiple facets of the environment simultaneously might strengthen the individual behaviour change results (Mercer et al., 2003). In addition, comprehensive approach to obesity will also help to prevent obesity in the whole population as treatment of people who are already obese can only have a marginal effect on population-wide prevalence (Avenell et al., 2004; Franz et al., 2007).

A Cochrane review assessing the long-term benefits and risks of pharmacological interventions for obesity using approved anti-obesity drugs: orlistat, sibutramine and rimonabant (in 2008 the European Medicines Agency recommended the suspension of prescribing rimonabant due to a high risk of serious psychiatric problems; marketing authorisation for sibutramine was suspended in the UK in 2010) showed that bariatric medications result in a modest weight loss (a net weight loss of around five kg or less over the placebo weight loss) and orlistat resulted in a clinically significant reduction in the risk of diabetes. None of the three drugs reduced the number of patients at risk of death or cardiovascular disease (Padwal, Li, & Lau, 2004). A study based on Swedish data suggests that those who were prescribed orlistat and a low fat diet were twice as likely as those only on a diet to have a ≥ 5 % weight loss at 3 months (48.9% versus 26.3%). The use of orlistat also increased quality-adjusted life-years and reduced the incidence of type II diabetes; however, a longer trial is needed to assess maintenance of the lost weight (Hertzman, 2005). Due to high attrition rates, the internal validity of those studies was limited and longer and more methodologically rigorous studies are required in order to examine the benefits of anti-obesity drugs.

Finally, a treatment option for obese people might be surgical intervention. In terms of clinical effectiveness, bariatric surgery is a more effective and more cost-effective intervention for moderately to severely obese patients than non-surgical options, leading to a greater weight loss. Bariatric surgery has a positive effect on diabetes, hyperlipidemia, hypertension, and obstructive sleep apnea as it reverses, eliminates or significantly ameliorates the risk of these obesity-related consequences (Picot et al., 2009). Bariatric

surgery appears to be a safe surgical procedure as it carries quite low risks, with the operative 30-day mortality rates of 0.1% for the restrictive procedures and 0.5% for gastric bypass, which is lower compared with other major surgical procedures (Buchwald, Avidor, & Braunwald, 2004). The most recent review and meta-analysis of randomised controlled trials comparing the effectiveness of bariatric surgery with non-surgical options included 11 studies with 796 individuals (BMI at baseline between 30-52). It showed that individuals who underwent bariatric surgery had significantly higher weight loss, greater remission of type II diabetes, metabolic syndrome, greater reductions in medicine use and greater improvements in quality of life compared with those who had non-surgical treatment for obesity (Gloy et al., 2013). However, these results are limited to two years' follow-up and no cost-effectiveness analysis was conducted.

In the UK, clinical interventions are guided by the National Institute for Health and Clinical Excellence (NICE) clinical guideline *Obesity: the Prevention, Identification, Assessment and Management of Overweight and Obesity in Adults and Children* (NICE, 2006) which covers four main areas: assessing people's weight status by the NHS staff, helping people lose weight, care guidelines for obese people and obesity prevention. Evaluation of the effectiveness of some of these approaches is available. For example, according to the guidelines, health care providers should discuss with a patient all available options including a referral to a commercial weight loss programme such as Weight Watchers. An evaluation of the Weight Watchers programme based on data from 853 patients, showed that 54% of those who participated lost 5% or more of initial body weight (an average weight loss was 5.2 kg) (Aston, Chatfield, & Jebb, 2007). In another study also examining the weight change of adults referred to Weight Watchers, data from 29 326 referral courses was used. 54% of courses were completed and 33% achieved a weight loss of 5% or more of initial body weight (Ahern, Olson, Aston, & Jebb, 2011). In neither of these studies follow up data or cost-effectiveness data was available, therefore the outcomes for those who did not join Weight Watchers despite being referred are not known; in both studies the majority (approximately 90%) of patients were women so the effectiveness of this approach for men could not be established. An incentive-based weight loss NHS programme has also been piloted. *Pounds for pounds* was delivered by a company Weight Wins with participants of this programme pledging to lose and maintain weight and earn cash (guaranteed amount) if they succeed. Rewards were calculated using an algorithm and ranged from £70 to £425 per year. 55% (402) of those invited activated their plan and of those 61.7% (248) left the programme without completing it. The mean weight loss was 6.4 kg, with 180 participants achieving clinically significant weight loss (≥ 5 % of initial body weight), while the estimated weight loss at 12 months was 4.0 kg (Relton, Strong, & Li, 2011).

As to pharmacological treatment of obesity, orlistat is currently the only prescribed drug in the UK. No evaluation on its effectiveness and cost-effectiveness within the NHS is available. In the UK, bariatric surgery is recommended as a treatment option for adults with a BMI ≥ 40 or for those with a BMI between 35 kg/m^2 and 40 kg/m^2 and suffering from another significant disease (however it is offered only when all appropriate non-surgical treatment options have been unsuccessful; only adults with a BMI of more than 50 40 kg/m^2 can be offered bariatric surgery as a first treatment option, NICE, 2006). Three types of bariatric procedures are most commonly performed in the UK: laparoscopic adjustable gastric band, gastric bypass and sleeve gastrectomy. The number of surgical procedures conducted in England within the NHS has increased significantly over recent years (from 470 in 2003/04 to over 6,500 in 2009/10) (National Obesity Observatory, 2010a). However, the use of bariatric surgery is not exclusively used to treat obesity, but also to address other conditions such as diabetes or sleep apnea.

V. Reducing food promotion

Food products can be advertised through seven different channels – TV advertising, radio advertising, print advertising, outdoor advertising, point of sale advertising, movie advertising and sponsorship (Engelhard et al., 2009). Reduction of food promotion is especially important for children who are not able to separate advertising claims from facts or balance advertising claims with information about healthy eating (House of Commons Health Committee, 2004). A number of studies reported an association between the duration of television viewing and children's adiposity (Dennison, Erb, & Jenkins, 2002; Kaur, Choi, Mayo, & Jo Harris, 2003; Viner & Cole, 2005) and while part of this relationship is mediated by reduced exercise levels, TV viewing is associated with differences in diet amount and quality such as increased snacking and reduced vegetable and fruit consumption (Halford et al., 2008). A mathematical simulation model to estimate the potential effects of reducing food promotion on the overweight and obese among 6- to 12-year old children in the US concluded that TV food advertising might be responsible for 15-40% of the obesity prevalence in this group and concluded that if TV food advertising was banned, a significant reduction in childhood obesity prevalence would be achieved. However, there was a wide margin of uncertainty due to difficulty in estimating the dose-response relationship between advertising and total energy intake (Veerman, Van Beeck, Barendregt, & Mackenbach, 2009). Apart from influencing children's product preference and purchase behaviour, food advertising is also hypothesized to contribute to obesity through triggering automatic snacking of any food available (of products not presented in

advertisements). This effect of advertising was shown in a study by Harris et al. (2009) where children who watched a cartoon with two advertisement breaks ate more snacks compared with the control group. What is more, the second experiment with adults showed that food advertising with a nutritional message inhibited automatic eating, while unhealthy snack advertising increased the consumption of food, including healthy snack options (vegetables)- suggesting that snack food advertising triggers automatic eating. However, this study was not able to identity which advertising characteristic affects eating behaviour.

In the UK, a report prepared for the Food Standards Agency on the effects of food promotion to children concluded that television advertising dominates food promotion, with four products (sugared cereals, savoury snacks, soft-drinks and confectionery) constituting the majority of products being advertised. It demonstrated that food advertising leads to greater preference and purchase of products being advertised (Hastings et al., 2003). In 2007, Ofcom introduced restrictions on television advertising of food and drink products high in fat, salt and sugar (HFSS) in or around programmes made for children (including pre-school children and up to 15 years of age). Although there is convincing evidence suggesting that this regulation was effective in reducing children's exposure to HFSS advertisements during children's TV (Boyland, Harrold, Kirkham, & Halford, 2011; Ofcom, 2010), the evidence regarding children's overall exposure to HFSS advertisements is less conclusive. A report by Ofcom suggests that it was reduced by 37% (Ofcom, 2010); however, another study showed that children's exposure to advertisements of less healthy products was not reduced and was associated with an increased exposure of HFSS among all viewers (Adams, Tyrrell, Adamson, & White, 2012). This might suggest that advertisers responded to this restriction by re-scheduling the time of advertisements being broadcasted or moving towards less-regulated media channels such as on-line (e.g. Coca-Cola Facebook fun page had 74 million 'fans' in 2013). There is no systematic evaluation of the restriction imposed by Ofcom and its possible influence on diet behaviour or weight status.

Two lessons can be learnt from the tobacco context regarding promotion and counter-advertising. Firstly, a ban on advertising and promotion is effective only when it is comprehensive i.e. covers all aspects of advertising and promotion. A limited ban on advertising will have little or no effect (Saffer & Chaloupka, 2000). Secondly, counter-marketing would not be effective unless it uses a variety of production styles and messages, and is of sufficient frequency, duration and reach (Flay, 1987). However, a key difference between anti-tobacco campaigns and anti-obesity campaigns is that anti-tobacco campaigns face no direct competition from tobacco companies as advertising of tobacco products was banned completely in the UK in 2004. What is more, the effect of anti-tobacco

adverts appears to be strengthened by other existing tobacco control policies (Chapman & Freeman, 2008).

VI. Food industry regulation/ monitoring

This strand of measures includes monitoring the impact of policy interventions, monitoring food manufacturers' actions and introducing voluntary and mandatory food regulations such as reduced salt requirements or portion-controlled packaging. Regulating product composition by introducing food regulations appears to be an effective obesity strategy. For example, it is estimated that approximately 75% of the salt people eat comes from processed foods, not from salt added during food preparation or consumption (NHS Choices, 2011a). Therefore, the regulation of the salt content in processed foods could have a positive impact on the population-wide salt intake. Bibbins-Domingo et al. (2010) suggest that even modest reductions in dietary salt intake could substantially reduce cardiovascular events and this would be more cost-effective than using lowering blood pressure medications. However, some authors have argued that performance-based regulation rather than ordering specific changes from food companies would bring more positive results (Sugarman & Sandman, 2007). For example, food catering companies responsible for providing lunches at schools would have to ensure that each child consumes two portions of fruit or vegetables during lunch (rather than requiring these companies to provide fresh fruit and vegetables during lunch time).

In England, there are currently no mandatory food industry regulations in place. A number of voluntary recommendations were proposed by the Food Standards Agency. For example, in March 2010, the Food Standards Agency published a plan to reduce saturated fat and added sugar, portion size availability for biscuits, cakes, buns, chocolate confectionery and soft drinks by the introduction of voluntary recommendations (Food Standards Agency, 2010b). The outcomes of the voluntary salt reduction recommendations (to reduce the salt consumption of the population from 9.5g to an average of 6g a day by 2010 – with an interim target of 10% reduction) suggest that some improvements can be achieved as the salt intake levels did drop from 9.5g in 2003 to 8.6 in 2010, which in part can be attributed to the changes food manufacturers have made (Food Standards Agency, 2010a). However, the behaviour change report published by the Science and Technology committee questioned whether the achieved salt reductions are solely attributed to the voluntary regulation or the result of the pressure on the food industry after the salt reduction campaign that publicly named and shamed products particularly high in salt (House of Lords Science and Technology Select Committee, 2011). This might suggest that the industry reduced salt

levels as it was in its commercial interest to be perceived to manufacture healthy food, not as a result of voluntary recommendations. The effectiveness of voluntary agreements might be limited because of the overriding commercial interests of businesses - the business sector might not be motivated to do anything that impacts upon their success, unless it is legislation and consistent for everybody. In addition, the evidence from the tobacco context suggests that food manufacturers might lobby for voluntary regulations that are better for their business (Fooks et al., 2011).

The analysis of tobacco industry internal documents revealed that the tobacco industry tried to undermine or successfully undermined public health policies (Gruning, Gilmore, & McKee, 2005; Grüning, Weishaar, Collin, & Gilmore, 2012). In order to manage the conflict of interest between public health and the tobacco industry on a global level, the WHO Framework on Tobacco Control clearly states that parties with a commercial interest such as the tobacco industry cannot be involved in setting and implementing public health policies (Wakefield, Cameron, & Murphy, 2009). However the WHO *Global Strategy on Diet, Physical Activity and Health* assumes scope for partnership with the food industry (WHO, 2004). Some authors have cautioned that there is not much difference between 'Big Tobacco', 'Big Food' or 'Big Booze' as their primary concern is to maximise their profit, thus oppose policies that could diminish that profit such as higher taxes.

Food companies have been found to use similar techniques to those used by the tobacco industry such as focusing on personal responsibility or using their own evaluation data (Brownell & Warner, 2009; Snow & Bruce, 2003). For example, in 2007, 11 major food and drinks manufacturers in Europe announced a pledge not to advertise to children under the age of 12 (except products that fulfil certain nutritional standards). Evaluation of this pledge undertaken by food companies showed that children's exposure to advertising and advertising impact has been reduced significantly, however these results do not agree with scientific evaluations which show that no reduction was achieved (Galbraith-Emami & Lobstein, 2013). This more positive evaluation could have been achieved by different definitions of an audience or different nutrient profiling definitions. In addition, in 2004, after the publication of the World Health Organisation's Global Strategy on Diet, Physical Activity and Health (DPAS) that urged global industry to join the battle with non-communicable diseases, the food and drink industry was reluctant to take action and were not fully engaged with this transformation (Lang, Rayner, & Kaelin, 2006).

In England in March 2011, the Public Health Responsibility Deal (DH, 2011d) was launched by the Department of Health, which aimed to give organisations that have a powerful

influence on people's food and physical activity choices, such as food manufacturers, a chance to have a positive impact on improving public health and tackling health inequalities. As part of this new deal, the Change4Life logo will be used by major food retailers and manufacturers such as Asda and Unilever to promote healthier products by for example offering vouchers for their own range products. In return, private businesses will sponsor governmental campaigns to promote healthy lifestyles (The Guardian, 2011). However, this cooperation with private business that produce alcohol and junk food has been criticised by a number of academics as it ignores the evidence from tobacco control (Gilmore, Savell, & Collin, 2011; Lang & Rayner, 2010). While Lang & Rayner (2010) agreed that industry should play their part in for example reducing the salt content of their products, they should not be involved in policy development and delivery. The evidence from tobacco control suggests that the main reason why producers want to be involved is because of image management. They want to be seen as socially responsible, which in turn helps normalise engagement and dialogue with the government, giving access to policymakers and cooperative relationships with policymakers to establish political authority (Fooks et al., 2011).

Changing the environment or providing active opportunities

Obesity policy strands presented above were classified according to existing classification of tobacco control policies. This classification however does not include policies that are designed to provide opportunities, support, and cues to help people develop healthier behaviours. Such interventions are aimed at changing the physical and socio-political environments and they serve as an important complement to individual-level programs (Brownson et al., 2006; Kahn et al., 2002). This type of intervention is not present within tobacco control as the main aim of tobacco control is to eliminate one product (therefore reduce opportunities for people to engage with smoking/ tobacco), while the main aim of obesity policies is to shift people's behaviour and encourage them to eat healthier and become more physically active. Some of these measures were discussed in previous sections (such as reducing portion sizes in industry regulation).

Restructuring the environment and providing active opportunities can vary in the degree to which people are aware of these interventions or have the choice to select a healthier or less healthy option. Examples of interventions where people are provided with active opportunities and are free to choose include: building cycling lanes; providing facilities for physical activity such as building more sports facilities; providing fitness gym equipment at workplaces; increasing the availability and access to healthy foods; use of point-of-decision-

prompts, which are cues to remind people about the opportunity to engage in physical activity (e.g. signs placed near lifts to encourage people to use stairs) and to remind them about the health benefits (e.g. how many more calories are burned by using the stairs instead of the lift) (Pratt et al., 2007).

The environment can be re-shaped in a way that eliminates unhealthy choices (people are presented with healthy options only). For example, restaurant menus can be altered so that only healthy options are available, unhealthy products from vending machines could be removed or portion sizes could be reduced (Pratt et al., 2007). The evidence for environmental policies that eliminate choice comes from studies targeting children and adolescents as there is larger support for this type of policy among the general public than for policies that target adults or the whole population (Evans, Renaud, Finkelstein, Kamerow, & Brown, 2006). For example, nutrition policy changes were introduced in five schools in the United States where all schools were required to follow certain nutrition standards (e.g. no soft drinks or improved quality a la carte menu in cafeterias). At 2 years, the number of overweight children in the intervention schools decreased by 10.3%, while it increased by 25.9% in control schools (however no differences in the prevalence of obesity were observed), which might suggest that this intervention was only successful for the lower end of the BMI distribution. In addition, the intervention resulted in partial prevention of weight gain (7.5% of children from the intervention schools became overweight after 2 years compared with 14.9% from control schools), which suggests that additional interventions might be needed for a complete prevention of weight gain (Foster et al., 2008). It is argued that these types of interventions that eliminate choice rather than provide healthy options are particularly effective among children and adolescents, as for children availability of healthy foods alone (i.e. when children have to make a choice between a healthy and unhealthy meal), might be insufficient for promoting healthy choices due to availability of competitive unhealthy foods (Koplan, Liverman, & Kraak, 2005).

Evidence regarding the effectiveness of such approaches that eliminate unhealthy choices among adults is scarce. One reason for this might be low acceptability of these interventions among the public (Vermeer, Steenhuis, & Seidell, 2009). For example, qualitative studies conducted with consumers and representatives of the catering industry exploring their attitudes towards point-of-purchase interventions aimed at portion size, suggest that both these groups had the most positive attitudes toward larger availability of portion sizes as it gave consumers the opportunity to choose. They also favoured portion-size labelling and proportional pricing of small and large portions. Both groups strongly opposed reducing

package serving sizes as it was perceived as paternalistic and reducing consumer freedom (Vermeer et al., 2009; Vermeer, Steenhuis, & Seidell, 2010).

A review of 19 studies that looked at physical environment factors associated with physical activity, concluded that accessibility of recreational facilities, opportunities to be physically active and aesthetic qualities were associated with increased physical activity - suggesting that strategies that aim to provide access to facilities that were previously not available to the local population might be an effective strategy to promote physical activity (Humpel, Owen, & Leslie, 2002). Results from an evaluation of such interventions confirm that they are effective for increasing physical activity (Kahn et al., 2002). A review of six studies of mall-based stairs interventions found that placing simple signs or banners can increase stair climbing, however no long term effects were established (Webb, Eves, & Kerr, 2011). The evidence for the effectiveness of interventions that provide active opportunities also comes from worksite interventions as they have a potential to reach a large population who spend a considerable amount of their time at the workplace. A review of 17 worksite interventions aiming to address dietary behaviour and physical activity found moderate evidence for the effectiveness of multicomponent interventions delivered at the workplace (Maes et al., 2012). However, as with many other interventions, the majority of these interventions used a combination of an educational component combined with environmental changes, therefore the effects of changes to the environment only cannot be isolated (Maes et al., 2012).

Although the reviews presented above concluded that such interventions could have positive effects on nutrition and physical activity levels, they are based on studies many of which are of weak or moderate methodological quality and some quite dated (published more than 30 years ago). For example, studies included in the review by Kahn et al., (2002) investigating the effects of point-of-decision-prompts (i.e. signs placed near lifts encouraging the use of stairs) were studies (n=6) conducted between 1980 and 2000 and the majority included no or only a short follow-up (e.g. 12 weeks); this made it difficult to establish whether the effects would dissipate over time (as for example people would get used to the signs placed). However, it is also possible that longer follow up times were not needed as in the study by Brownell et al. (1980) the levels of stair use reverted to the pre-intervention levels by the 12-week follow-up.

More recent evidence regarding the effectiveness of physical activity interventions is available. A systematic review of 100 reviews from around the world (published mostly in English, Spanish and Portuguese) concluded that adults' level of physical activity could be

increased with the implementation of policies and environmental support such as urban planning which in turn would increase opportunities for physical activity and promote active living (Heath et al., 2012). However, the evaluation of such an extensive evidence base is difficult as physical activity intervention encompasses a wide range of initiatives including campaigns and informational approaches, behavioural management skills and environmental and policy approaches.

What is more, measurement of physical activity is a complex procedure. A valid and reliable measure of physical activity should assess frequency and duration of physical activity, measure improvements in physical activity, evaluate whether individuals meet the recommended levels of physical activity and how it compares with other individuals from the same specified population, examine the effects of physical activity of different intensity on health parameters and help evaluate the effects of interventions (Helmerhorst, Brage, Warren, Bessen, & Ekelund, 2012). All these criteria might not be easily met in large-scale trials of physical activity which tend to use self-reported measures of physical activity (questionnaires) due to their low cost and convenience. However, data obtained from such measures might be limited due to desirability bias or bias related to recall of information; hence, in recent years the use of objective methods for the assessment of physical activity data has become widespread (Baptista et al., 2012; Hansen, Kolle, Dyrstad, Holme, & Anderssen, 2012; Troiano et al., 2008). Some authors have argued that both types of data (self-reported and objective measurement) should be collected (e.g. Helmerhorst et al., 2012), however this also might be problematic as the correlation between self-reported and objective monitoring of physical activity is low-to-moderate and it is difficult to determine how valid self-reported measures are in relation to direct measures of physical activity (Prince et al., 2008).

2.4.3 Outcomes of obesity policy to date

Targets set in the *Health of the Nation* white paper (1992) (to reduce obesity rates from 12% in 1986-1987 to 8% in 2005 among women and from 8% to 6% among men) were not met as by 2005 there was a twofold increase in obesity among women (24.8% of women were obese in 2005) and an almost threefold increase of obese men (23.1% of men were classified as obese in 2005) (NHS Information Centre, 2006). The target to halt the year-on-year increase in obesity among children under 11 by the year 2010 set in 2004 in the *Choosing Health: Making Healthy Choices Easier* (DH, 2004) was abandoned in 2008. A new target was set to reverse the rising obesity trend among children and to reduce the

childhood overweight and obesity prevalence to 2000 levels by 2020. While childhood obesity rates were increasing steadily by 0.5% per year between 1995 and 2004, since 2005 the rate of increase has slowed down and childhood obesity rates in England have levelled off (National Obesity Observatory, 2010b). Thus, there is some evidence that progress is being made in introducing policies intended to tackle childhood obesity; however, the obesity epidemic is not abating. According to the latest statistics, in 2011, 65% of men and 59% of women were either overweight or obese (The Health and Social Care Information Centre, 2013).

There are numerous possible reasons why obesity policies have not been effective so far. Policymakers have been slow to recognize the seriousness of the obesity epidemic. The obesity crisis, especially among children was not fully recognised until the 2002 Chief Medical Report (DH & Chief Medical Officer, 2003). In addition, obesity policy in the UK continues to focus on individual behaviour change, informed choice and responsibility. This 'downstream' approach does not take into account that individual choice is made within the context of a larger environment (e.g. urban planning policies may encourage or discourage walking or cycling, while the local supermarket might influence the availability of fresh fruit) (Musingarimi, 2009). The 'downstream' approach does not appear adequate for children on whom the obesity policy tends to focus as children are not in control of the environment they live in (Canoy & Buchan, 2007).

Although the 1992 white paper the *Health of the Nation* was criticised for focusing on individuals and their role in health (Holland & Stewart, 1998), the subsequent white papers published between 1999 and 2010 continued with this approach. The possible reason why the government focuses on the 'downstream' approach and prefers the language of individual responsibility might be that it is afraid of being accused of adopting nanny statism (Lang & Rayner, 2003). A plan to focus on non-regulatory interventions- so called 'nudges'- without using regulations has been recently announced (HM Government, 2010). However, the term nudge can be understood differently. As originally defined by Thaler & Sunstein, nudge is "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid" (Thaler & Sustein, 2008, p.6). However, some authors have argued that real nudges should not rely on people's reflective mechanisms, but automatic mechanisms (Strack & Deutsch, 2004); therefore, they should not aim to influence the rational consumer and cannot involve the use of incentives (Hausman & Welch, 2010). However, there is not much evidence to show how this approach can be used in practice as there is no operational definition of the nudge

(Marteau, Ogilvie, Roland, Suhrcke, & Kelly, 2011). Finally, there is substantial evidence that such non-regulatory approaches are not likely to work in isolation and that mandatory regulations are also needed as comprehensive approaches are most likely to be effective (House of Lords Science and Technology Select Committee, 2011). Comprehensive approaches might give people the structure and support needed for the behaviour change.

The problem of introducing initiatives in isolation is also evident among other approaches that have been introduced in England. For example, the restrictions on advertising aimed at children imposed by Ofcom are not likely to be effective because they do not cover all aspects of advertising and promotion. For those restrictions to have a desired effect, additional action across all relevant government departments is required such as mandatory targets for food manufacturers to improve the formulation of their products, extra taxes on high-calorie dense foods, health promotion initiatives at school etc. Moreover, the government focuses on obesity and underestimates the threats posed by physical inactivity in healthy weight people. The evidence suggests that people of normal weight but unfit have lower fitness levels compared with overweight but fit individuals and the health benefits of being a healthy weight might be limited only to fit individuals (Blair & Church, 2004; Lee et al., 1999; Wei et al., 1999). More strategies are needed to help healthy weight people be more physically active, help people from becoming overweight and help those who manage to lose weight to keep the weight off permanently (Hill, Thompson, & Wyatt, 2005).

However, a number of difficulties with the formulation, implementation and assessment of the policy that aims to address obesity and physical inactivity should be acknowledged. Obesity policies are governed at many levels (e.g. European, national), therefore policymakers might lack control over them. For example, there is evidence suggesting that the European Union Common Agricultural Policy may be contributing to elevated intakes of some unhealthy foods. Currently the surpluses of the food are being sold to the food manufacturers with subsidises causing the overproduction of foods that are rich in calories and fat. Food manufacturers have no incentives to change the formula of their products (Lobstein, Millstone, Jacobs, Stirling, & Mohebati, 2009). There are no comprehensive models for obesity prevention and available scientific evidence suggests that at the population level only limited gains to the obesity policy exist (Lang & Rayner, 2007). More research is needed especially into population measures to help people maintain a healthy weight (Hill et al., 2005). Also the evidence on the influence of the obesogenic environment (geographical factors, built environment, distribution of food systems etc.) and how its influence can be reversed is lacking (Canoy & Buchan, 2007).

Although many studies have shown that obesity policies can have an effect on people's behaviour by for example changing people's purchase behaviour, these studies offer little explanation as to how the change was achieved (i.e. why individuals changed their behaviour). For example, a review exploring consumer use and understanding of nutrition labels on pre-packaged foods and their impact on the quality of diets included 120 articles and the review concluded that the use of labels is consistently associated with better diet quality (Campos et al., 2011). However, no mechanism of how labels exert their effects on people's diet was offered (e.g. do they improve people's self-efficacy to eat a healthier diet?). Although these studies were useful in terms of informing us that food labelling can have a positive impact on an individual's diet, they did not provide hypothesized causal processes that led to that effect. Investigating these processes could provide more proximal targets for behaviour change intervention (i.e. mediators and moderators) (Hardeman et al., 2005). For example, if studies established that food labels exert their effects by increasing consumer awareness about the negative consequences of eating particular nutrients in excess, labels that inform consumers about nutrients such as saturated fat or sodium and their effects for health could be introduced.

2.4.4 Potential for the translation of effects across domains

While many researchers recommend that lessons could be drawn from the tobacco experience for the organisation of more successful obesity control (Dorfman et al., 2004; Engelhard et al., 2009; Garson & Engelhard, 2007; Green et al., 2006; Mercer et al., 2003; West, 2007; Yach et al., 2003; Yach et al., 2005), there is little research that directly records the process of translating approaches between domains, nor robust evaluations of policy level interventions that seek to identify the core, key components responsible for positive effects that should be retained through the process of adaptation. However, some studies exist that report on similar approaches in different behavioural domains that may shed some light on the translation of the evidence. The section below sets out an example of the range of evidence across behaviour domains for brief abstinence community campaign interventions, highlighting the features that available evaluations may suggest are necessary for success.

The World Health Organisation created World No Tobacco Day in 1987 and it has been running ever since. This event aims to highlight the negative health consequences of smoking and advocate effective tobacco control policies; during this day smokers are encouraged to abstain from tobacco for a 24-hour period. Each year the WHO selects a theme for the day which aims to emphasize the truth about tobacco and the tobacco industry. For example, in 2006 the theme was *Tobacco: Deadly in any form or disguise* and this message aimed to show smokers that tobacco manufacturers create the illusion of healthier products (e.g. light cigarettes), but in reality there are no healthier forms of tobacco and the tobacco industry only aims to increase their profits (WHO, 2006). Since 2008, materials related to the theme in the form of brochures, posters, website and YouTube videos are promoted to strengthen the dissemination of the message.

However, no formal evaluation of this campaign has been undertaken so its effectiveness has remained unexplored, which in part can be attributed to difficulties in assessing the impact of a single awareness day. The only evaluation available that assessed the impact of World No Tobacco Day was an evaluation conducted in seven Latin America countries (Ecuador, Colombia, Venezuela, Argentina, Peru, Chile, and Mexico) which aimed to assess its impact on population awareness of this day and interest in cessation (Ayers et al., 2012). Data analysed included daily digital surveillance such as daily news coverage and Internet search queries for cessation resources (as it was hypothesised that media coverage would prompt some smokers to seek advice on cessation on the Internet). Results show that in Mexico news coverage and internet queries spiked (147 per 100 000 news stories compared with an average of 30 per 100 000 across the year) and queries on

smoking cessation remained higher for a week after. Results were very similar in the remaining six countries. However, this was a pulse effect rather than a long-term effect and it is not known how many smokers managed to stay quit for the 24-hour period or the effect on smoking cessation attempts. In addition, these effects might differ from effects in developed countries as World No Tobacco Day appears to have a stronger effect in countries with limited tobacco control policies and limited smoking cessation services.

There is also a UK specific No Smoking Day which runs on the second Wednesday in March since 1984. The three main aims of this annual event are to promote many benefits of quitting smoking, provide an opportunity for quitting smoking and promote awareness of smoking cessation support available. Similar to the World No Tobacco Day, No Smoking Day (NSD) uses different slogans, but also images and each year develops a new advertising campaign. For example, the slogan for 2006 No Smoking day was *Serious about stopping? You can do it* and for 2002 *Sick of smoking?* (Public Health Agency, 2009). Evaluation undertaken in 2006 in Northern Ireland which aimed to assess awareness of this campaign and assess how many people took part using a representative sample (N=1006 adults), showed that 80% of participants were aware of the day and awareness was higher in smokers compared with non-smokers (87% vs. 78%). Among smokers, awareness was highest among those who would like to stop soon (93%) or stop one day (92%) and lowest among those who never thought about it (78%). 15% of smokers who were aware of the No Smoking Day stopped or attempted to stop smoking on the day, however they were more likely to be light smokers (smoking 5 or less cigarettes per day), were more likely to be from C2 or DE social class and did not use any of the services available (Health Promotion Agency, 2006). These results suggest that this type of campaign might be more effective for light smokers who are ready to quit. In England, a small scale evaluation of the No Smoking Day was undertaken which compared responses of 1309 smokers from a survey undertaken a month following NSD, with responses from smokers (n= 2672) collected in the previous year (in the months adjacent to the NSD- March and May)(Kotz et al., 2010). Authors of this study estimated that NSD resulted in 0.07% of the smoking population (8.5 million) quitting smoking permanently as a response to NSD, therefore judged this intervention as extremely cost-effective intervention. However, there are a number of limitations to this evaluation: firstly, results are based on self-reported data and secondly the analysis has not accounted for possible influences of other policies which were in place at the time of the NSD such as the introduction of the smokefree legislation in July 2007. What is more, no mechanism of the action was undertaken (why some smokers decided to stop smoking on this day) and effects on long term cessation are not known.

Recently (in 2012), a campaign has been introduced in the UK which encourages smokers to stop smoking for 28 days (Stoptober). This campaign is based on the research finding which shows that smokers who can stay quit for 28 days are five times more likely to quit. It aims to create a 'positive mass quit attempt' and to create a perception that many people are attempting to quit. This campaign is run both locally (local events, materials for local use) as well as nationally (paid TV and radio advertising) to help people through this 28 day journey (Fox & Hampton, 2013). In 2012, 275 000 registered to take part in Stoptober and of those 160 000 completed the challenge (Campaign live, 2013). The effectiveness of the campaign was assessed using data from independent tracking surveys which did not ask specifically about Stoptober. Quit rates during Stoptober (October 2012) were compared with quit attempts in other months of the same year and quit attempts in Octobers in five previous years (Octobers between 2007-2011), which was again compared with other months of these years. There was a 50% increase in quit attempts during Stoptober (in October 2012) and it is estimated that this campaign generated 350,000 additional quit attempts and it was equally effective among different social groups (age, sex, social grade) (Brown et al., 2013). However, it is not known how many of these attempts were successful in the long term.

Similar campaigns based on the idea of 'mass change effect' were introduced in the area of alcohol. A number of interventions where people pledge to stop drinking alcohol for one month have been introduced in Australia (e.g. Febfast, Dry July, Ocsober) and recently in the UK (organised by major alcohol and cancer charities: Dry January- Alcohol Concern; Cancer Research UK- Dryathlon, Macmillian- Go Sober for October). Febfast has been the longest running campaign of this type (since 2007) and is organised each year in Australia in February. Participants of Febfast sign a pledge to take a 28 day long break from alcohol in support of a charity with money raised helping those with alcohol or drug issues. To help participants achieve the goal they are provided with a number of tools and resources such as access to an online community of people who attempt the challenge, recipes for alcohol-free cocktails, a list of Febfast friendly locations that do not serve alcohol such as cafes, and a guide to Febfast that includes tips about health and not drinking alcohol (Febfast, 2013a). One of the tools that participants are encouraged to use is a tool enabling people to compare their physical fitness and mental functioning before and after completing Febfast to help them appreciate the benefits of the challenge or a tool that enables people to calculate how much money they spend on alcohol and how much money they are going to save through participation (Febfast, 2013b).

Since the campaign started, the programme has raised over $4.5 million, with over 20 000 Australians participating each year. An evaluation of this campaign was undertaken in 2011 and included 1300 participants (of those almost 35% would normally drink 3 to 4 times a week). The main reported reason for taking part was to take a break from drinking alcohol (77.1%) and as a personal challenge (63.8%). 80% of participants felt that it was easier to take a break from drinking alcohol as a result of participating in Febfast than it would be on their own and taking part in Febfast was perceived as an excuse not to drink during social occasions. Importantly, participants did not stop going out during Febfast and were having soft drinks instead of alcoholic drinks. Febfast had a positive impact on actual behaviour following completion of the campaign. Two thirds of respondents had more alcohol-free days and just under 50% reported drinking less, and of those (reporting either changes in frequency or amount of drinking) one third maintained the changes for a year (Victorian Health Promotion Foundation, 2012). From February 2014, Febfast was extended to include other 'addictions' including caffeine, high sugar foods and digital overload. Other campaigns which are based on the same premise offer participants similar tools to achieve their target. For example, Go Sober for October organised by Macmillan Cancer support also offers participants access to social media pages or recipes for alcohol-free cocktails (Macmillan cancer support, 2013), however it appears that the UK version focuses more on fundraising, while Australian Febfast places equal importance on personal benefits that not drinking for a month could have for participants (e.g. improved sleep quality) as well as raising money for a good cause.

Similar campaigns have been also run in the food domain, but they took the form of a swap rather than eliminating unhealthy food and did not have a time limit (it was hoped that participants would change their habits for a lifetime). For example, a Swapathon campaign was introduced in 2011 as part of the Change 4Life campaign and it aimed to encourage people to swap unhealthy lifestyle habits (eating, drinking or physical activity) for healthier ones. It aimed to convey the message that by introducing small, simple swaps, people can start leading healthier lifestyles without the need to deprive themselves of the things they like (Change 4Life, 2012). It encouraged participants to swap for example latte coffee for a skimmed milk version or swap white toast bread for wholegrain or brown bread. Promotional materials such as the snack swapper - a wheel device that helps participants choose healthier alternatives to sugary, salty or fatty snacks were distributed (Change 4Life, 2011). Vouchers were being offered (5m booklets containing £50 worth of Change4Life vouchers were distributed), as part of this campaign as it is recognised that healthy choices might be more expensive (DH, 2011a). However, this campaign has been criticised for poor evaluation (House of Lords Science and Technology Select Committee, 2011), and the use

of incentives to promote healthy eating and for involving food producers (e.g. Asda) which might have conflicting interests as partners (BBC News Health, 2011). The government claims Swapathon works as for example 120 000 online swaps took place (Marketing Week, 2011); however, no formal evaluation of this campaign is available.

A Swap it, don't stop it campaign was introduced in Australia in 2011 as part of the Measure up campaign. The campaign's aim was to show people how they can make small nutrition and physical activity changes in everyday life that can positively benefit their health. The main campaign message was "you can lose your belly without losing out on all the things you love" (Australian Government, 2011). It targeted parents aged 25 – 50 years and adults aged 45 – 65 years. Evaluation of the campaign showed that in the first year of the campaign running 740 000 people visited the Swap It website, 50 000 downloaded the iPhone Swap it application and 14% made regular swaps (Government, 2012). The evaluation also said that: "There was evidence of a small number of positive changes in awareness, attitudes and behaviours relating to healthy lifestyles and chronic diseases and that some members of the target audiences had taken action in line with the campaign's 'how to' messages (The Sydney Morning Herald, 2012). However formal evaluation of the campaign could not be accessed. It is difficult to evaluate the effectiveness of these food based interventions (e.g. Swapathon) in terms of successful translation of the evidence from the tobacco or alcohol context as in the first place no rigorous evaluation of this type of intervention is available. It appears that they simply imitated apparently successful initiatives; however, no insight into the mechanism of how the change was achieved is available.

2.4.5 Individual level effects of tobacco control and obesity policies

As demonstrated by the review of tobacco control and obesity policies, such measures have been demonstrated to be effective in reducing tobacco prevalence, and to a lesser extent in reducing obesity prevalence. For tobacco control policies, the evaluation of such measures has focused mostly on assessing the effectiveness of these in terms of reducing smoking rates, for both existing measures (e.g. Fong et al., 2006; Hackshaw et al., 2010) and future proposed approaches (e.g. Germain, Wakefield, & Durkin, 2010; Thrasher, Rousu, Hammond, Navarro, & Corrigan, 2011). For example, numerous evaluations of the effects of the smoke-free legislation using interrupted time series analysis have demonstrated that it reduces daily cigarette consumption and smoking prevalence, exposure to second hand smoke (Callinan et al., 2011; Naiman et al. 2011) and the number of hospital admissions for respiratory, cardiac and cerebrovascular diseases (Tan & Glantz, 2012).

A study by Pell et al. (2008) investigated the number of admissions for acute coronary heart syndrome in nine Scottish hospitals during the ten month period prior to the smoke-free legislation and ten months after the law introduction. The results demonstrated a reduction in the number of admissions for acute coronary syndrome: by 14% among current smokers, by 19% among ex-smokers and by 21% among those who have never smoked. However, these studies have not offered a mechanism to explain why smokers have responded to the legislation in this way and some (unexpected) results of the legislation could not be explained. For example, following the enaction of the smoke-free law, children's exposure to second-hand smoke at home was reduced, although concerns have been expressed that smokers would displace smoking from public places and into private ones (i.e. the home) (Holliday, Moore, & Moore, 2009). Some studies have suggested that this effect could be brought by smokers enacting voluntary home smoking bans (Kabir et al., 2010; Mons et al., 2011). The section below outlines the benefits of taking the theoretical approach which could explore the effect of policies on individual level motivation and behaviour and the challenges in the application of theoretical frameworks.

2.5 Section 5: The benefits of a theoretical approach to behaviour change

Recent guidance on evaluation of complex interventions by the Medical Research Council has called for new methods of evaluation that not only include evidence on what types of interventions work, but also how they work (causal mechanism) (Craig et al., 2013). Identifying underlying mechanisms could be enhanced by the use of a behaviour change theory (Michie & Prestwich, 2010) as it may offer a summary of hypothesized causal processes (i.e. mediators and moderators) which in turn may help understand the process by which the intervention exerted its effects on behaviour by having either a direct or an indirect impact (Hardeman et al., 2005). An indirect outcome (mediation) may occur if the intervention improved outcomes of a psychosocial variable such as self-efficacy which is believed to affect behaviour. Moderators may help to clarify the effectiveness of the intervention for a specific population (e.g. particular sociodemographic group) and specific circumstances (e.g. delivered at home) (Patrick & Williams, 2012). Therefore, establishing mediators and moderators of an intervention allows the selection of appropriate intervention techniques which can be appropriately tailored producing more innovative interventions (Dolan, Hallsworth, Halpern, King, & Vlaev, 2010), which can result in stronger effects of the intervention (Albarracín et al., 2005). Studies developed within a conceptual framework can also aid understanding of the effectiveness or ineffectiveness of the intervention (Michie & Abraham, 2004). Identifying the underlying mechanism would offer guidance as to how a

similar intervention for a new context or population should be designed (Michie, Johnston, Francis, Hardeman, & Eccles, 2008).

The assessment of mediators and moderators has advanced knowledge and influenced practice. For example, implementation of the '5 A Day for Better Health' initiative by The National Cancer Institute in the US was informed by previous research showing that knowledge regarding the recommended fruit and vegetable intake, self-efficacy and taste preferences are important mediators of fruit and vegetable consumption. Therefore, an intervention targeting these constructs was developed and implemented by targeting public awareness and professional education and changing the food system by for example increasing the availability of fresh fruit and vegetables. The programme achieved a 10% increase in knowledge (from 8% to 18%) and also an increased consumption of fruit and vegetables (between 0.62 and 1.68 per day); however, as the programme has been running over many years it was difficult to establish to what extent these changes in consumption were solely attributable to this programme (Potter et al., 2000). Mediation analysis was also undertaken to establish whether the theoretical basis of changing dietary habits was confirmed. Results showed that knowledge regarding the recommended intake of fruit and vegetables and self-efficacy were mediating the intervention effects (Campbell et al., 2008). This finding demonstrates that translating evidence into practice can advance the state of the science and enable the creation of more effective and cost-effective programmes.

However, the practice of using theory of behaviour or behaviour change does not appear to be widely used in the policy domain. This might arise due to difficulties in specifying determinants of behaviour change rather than policymakers' ignorance of the guidance. Specifying determinants of behaviour change might not be easily achievable as policymakers might not be able to identify all key variables that influence particular behaviour and the actual intervention might not be successful at addressing these determinants of behaviour change (Baranowski, Cullen, & Baranowski, 1999). In addition, literature on behaviour change is extensive and offers many different models of health behaviour and health behaviour change; however, studies evaluating these models are often poorly designed, fail to take into account confounding variables - therefore the evidence supporting the use of these models is inconsistent (NICE, 2007). For example, a review by Ashford (2002) which aimed to identify theoretical models explaining behaviour change suggested 20 theories with many different theoretical constructs that could be used. A group of practitioners, researchers, stakeholder representatives and members of the public working on the guidance on behaviour change interventions at populational and community level commissioned by NICE, concluded that currently there is no support for

any particular theory (NICE, 2007). Therefore other researches have recommended that problem-driven or action-driven research conducted to tackle a specific problem should use concepts or perspectives from different theories (Brug, Oenema, & Ferreira, 2005). However, drawing from such a large number of theories and constructs does not provide a good basis to select which theory or construct should be applied (as in practical terms all of them cannot be fully applied) and also it increases the probability that critical theories might not be included (Michie et al., 2005).

Many theories of behaviour change share or use overlapping constructs, therefore identification of the constructs that relate to behaviour change from across a range of theories might enhance future implementation of these theories into practice. Two independent attempts were made to identify these constructs that relate to behaviour change (Fishbein, Triandis, Kanfer, Becker, & Middlestadt, 2001; Michie et al., 2005). A review by Michie et al. (2005), initially identified 128 behavioural determinants (constructs) drawing on 33 psychological theories. These determinants were then simplified/ classified into 12 construct domains such as intention or skills that explain behaviour change; these are presented in Appendix 2.4 alongside the constructs identified by the second review by Fishbein et al. (2001). However, while these reviews identified key constructs related to behaviour change that may enhance understanding of the behaviour change processes, they do not illustrate a causal link between these constructs to provide a coherent explanation of behaviour change (e.g. that attitudes predict intentions). Also identifying constructs might offer little help in replicating or comparing the effectiveness of interventions as interventions usually are complex and use many, often interacting components (Craig et al., 2013).

Replication of effective interventions also requires establishing standardised definitions of effective intervention ingredients (i.e. behaviour change techniques) that stem from different constructs (Abraham & Michie, 2008). For example, if a review of interventions targeting physical activity found that interventions that combined self-monitoring with increasing self-efficacy were more effective than interventions targeting self-monitoring alone, translation of this evidence would be greatly enhanced if there was a standardised definition of these two techniques. Such a taxonomy has been developed by Abraham & Michie (2008) and later refined (Michie et al., 2011) and includes 40 behaviour change techniques. However, the effectiveness of implementing different techniques might differ between behaviours. For example, it has been shown that implantation intentions are effective in addressing weak habits rather than well-established habits (Verplanken & Wood, 2006).

2.5.1 Evidence for multi-component approaches to behaviour change

Research evidence suggests that interventions that target both diet and physical activity are associated with better outcomes (greater weight loss) compared with interventions that target one aspect of the energy balance (Avenell et al., 2004; Greaves et al., 2011; Shaw, O'Rourke, Del Mar, & Kenardy, 2005; Sweet & Fortier, 2010), which suggests that targeting both diet and physical activity might be more effective in reducing obesity. Policymakers should consider targeting influences on these behaviours at different levels, as interventions that target individual, societal and environmental level factors have been shown to be more effective than those targeting only one level of influence (i.e. individual, societal or environmental) (Scottish Government Social Research, 2011). For example, it has been shown that initial weight loss could be improved by the provision of exercise equipment (Jakicic, Wing, Butler, & Jeffery, 1997) or prescribing low energy intake (Wadden, Foster, & Letizia, 1994) in addition to addressing people's cognitions about weight. A review of 42 studies from published and grey literature (De Bourdeaudhuij et al., 2011) examining the effectiveness of school-based interventions to promote healthy nutrition in children and adolescents concluded that for children (aged 6-12 years old) multicomponent interventions combining educational components with environmental approaches (e.g. fruit distribution programme) were more effective for changing dietary behaviour than programmes that focus only on education or environmental change. In adolescents (13-17 years old), moderate evidence was found for educational programmes, while limited evidence for multicomponent interventions and their effect on diet quality. However, 62% of the studies in children and 38% of the studies in adolescents included in this review involved parents to some degree (who are believed to have a strong influence on children's and adolescents' nutrition), therefore it is difficult to conclude how this factor affected the outcomes of these studies. Similar conclusions were provided in two other reviews which found the most evidence for the effectiveness of multicomponent interventions (e.g. combining nutritional education and price interventions) to improve children's diets (de Sa & Lock, 2008; Jaime & Lock, 2009). However, for studies that target both individual and environmental factors, it might not be possible to establish the relative importance of individual level factors compared with social and environmental factors; therefore, it is not known what proportion of variance in behaviour change individual level factors explain (Brug et al., 2005).

The use of many behaviour change techniques is associated with increased effectiveness compared with interventions that use fewer behaviour change techniques. A meta-regression of behaviour change interventions to address healthy eating and physical activity that employed the use of behavioural change techniques by Michie et al. (2009) included 122 evaluations of interventions (35 targeted healthy eating, 51 targeted physical activity

and 18 targeted both). The majority of studies used more than one behaviour change technique (six on average). Studies that employed self-monitoring combined with at least one other behaviour change technique were significantly more effective than other interventions.

A review of reviews examining intervention components that are associated with increased change in diet and/or physical activity in individuals at risk of type 2 diabetes was conducted and included 30 reviews (Greaves et al., 2011). Results suggest that interventions were more likely to be effective if they targeted diet and physical activity, involved the use of established behavioural change techniques (in particular those associated with self-regulation such as goal-setting), mobilised social support and had a higher frequency of contacts. However, there was not much support for the effectiveness of these techniques for weight loss maintenance and weight loss tended to reverse. Another review looked at interventions aimed at weight gain prevention interventions among adults which included 9 randomised controlled trials (Lombard, Deeks, & Teede, 2009). Eight studies reported no increase in weight or weight loss compared with the control group (as expected in the prevention studies). Studies varied in terms of length of intervention, active components used and intensity making them difficult to compare and to identify effective components. The review concluded that interventions that targeted different factors, that combined diet and physical activity, included behaviour change techniques (self-monitoring of weight in particular) and which included more personalized advice were most successful.

2.5.2 Challenges to application of models and frameworks

Although key constructs to behaviour change such as self-efficacy might be useful in explaining people's behaviour and to plan and deliver effective interventions, there are limitations to the approaches that people have taken in applying them. For the successful application of models and frameworks based on these behavioural concepts, policy makers have to understand clearly whose behaviour (i.e. target group) and which specific behaviour (i.e. target behaviour) they want to address as targeted interventions are more likely to work (Scottish Government Social Research, 2011). Obesity is a complex problem that encompasses many different behaviours (Darnton, 2008a), therefore specifying target behaviour or a target audience might be problematic. Once the behaviour and target group are identified and a successful intervention is implemented, it might lead to other often unintended changes (NICE, 2007). For example, someone who stops eating crisps may start to eat more chocolate to compensate for the energy imbalance. While studies developed within a conceptual framework can aid understanding of the effectiveness or

ineffectiveness of the intervention (Michie & Abraham, 2004) and effectiveness or ineffectiveness could be attributed to the determinants of the behaviour, it could have been caused by other contextual factors that have been equally important determinants of behaviour change (Scottish Government Social Research, 2011).

A problem with intervention evaluation is defining the success (main primary outcome) or failure of the intervention. What might appear successful along one criterion, might not constitute a success along others (Scottish Government Social Research, 2011). For example, provision of healthy school lunches might be successful in terms of increasing the number of portions of fruit and vegetables pupils eat, but the impact on health might be in part offset by children eating more unhealthy food at home. Therefore process evaluation of policies integrated with outcome evaluation would offer a valuable insight into the intervention findings, as it not only can help answer the questions as to whether the intervention was implemented as intended and aid understanding between specific intervention elements and intervention outcomes, but might also help to explain success, failure or unexpected findings of the intervention (Armstrong et al., 2008). This emphasizes the importance of good policy evaluation.

2.6 Section 6: Overview of Self Determination Theory

Self Determination Theory (SDT) is a macro theory of human motivation, well-being and personality development. The foundations of SDT reside in the assumption that all individuals have a natural and innate tendency towards psychological growth, integration and development, and these human organismic tendencies can be either nurtured or impeded by the social context. SDT views psychological growth and integrity as an interaction between an active human and social context and predicts a broad array of developmental outcomes (Ryan & Deci, 2002). According to SDT people's motivation is a primary determinant of behaviour, thus by addressing motivation, changes in behaviour can be achieved. There are five mini-theories within Self-determination theory that describe environmental characteristics that affect to what extent people feel self-determined or in contrast controlled in their actions. These theories are presented below.

2.6.1 Cognitive Evaluation Theory (CET)

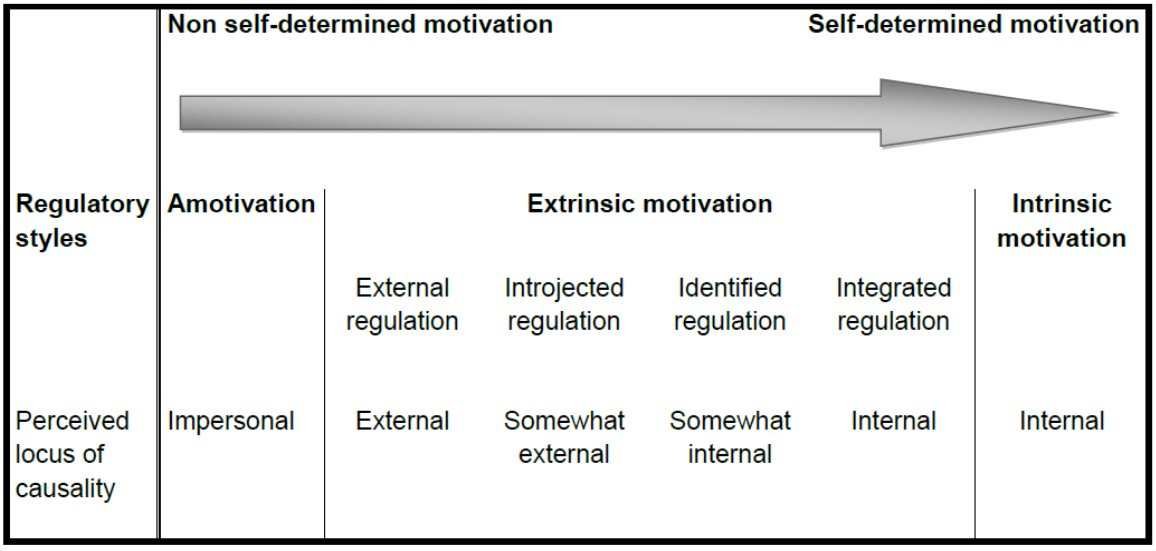
CET (Deci & Ryan, 1975) was the first SDT mini theory developed to explain variability in intrinsic motivation (inherent satisfaction of the behaviour per se), which can be undermined or facilitated by social and environmental factors. An empirical basis of CET comes from studies investigating the factors that either undermine or support intrinsic motivation e.g. how extrinsic rewards such as money affect people's intrinsic motivation. A meta-analysis of 128 experimental studies by Deci et al. (1999) suggested that on average intrinsic motivation is undermined by tangible rewards (but not by unexpected tangible rewards), while verbal rewards tend to have a positive effect. The proposed mechanism for the detrimental effect of tangible rewards was by shifting the perceived locus of causality from internal to external thus undermining people's responsibility for motivating or regulating their behaviour.

2.6.2 Organismic Integration Theory (OIE)

CET is concerned primarily with activities that people find interesting and optimally challenging, however it might not be relevant to the majority of behaviours that people perform in their daily lives such as brushing teeth as these activities are not intrinsically motivated although people still continue to self-regulate and perform them (Ryan et al., 2008). SDT recognizes that multiple reasons might drive people's behaviour and Organismic Integration Theory (Ryan & Deci, 2002) offers further insights into the nature of different qualities of motivation. There are three main types of motivation: intrinsic motivation, extrinsic motivation and amotivation. Intrinsic motivation, which is the most self-

determined type of motivation, is described as experiencing inherent satisfaction of the behaviour per se. On the other side of the motivational continuum lies amotivation which is the state of lacking the motivation to act where people do not act at all or act passively. Amotivation is in many ways similar to learned helplessness (Abramson, Seligman, & Teasdale, 1978). Between amotivation and intrinsic motivation lies extrinsic motivation, which is engaging in an activity to attain an end outcome of the activity that is separate from the behaviour itself; thus this behaviour stems from external control. Within extrinsic motivation four types of regulations are distinguished: external regulation, introjected regulation, identified regulation and integrated regulation. They differ in terms of the degree to which motivation is experienced as controlled versus autonomous. The distribution of motivational regulations is presented in Figure 2.1

Figure 2.1 Continuum of Self-determined motivation (Ryan & Deci, 2002).



1. *External regulation*- is the least self-determined (autonomous) form of extrinsic motivation. One's reason to undertake a behaviour is either to obtain tangible rewards, avoid penalties or through coercion. The value of the behaviour has not been internalised at all (internalisation refers to a process where people endorse a value for behaviour regulation). Taking the example of physical activity, external motivation would be an individual joining a gym as s/he has to pass the Police Fitness Test.
2. *Introjected regulation*- describes motivation with some degree of personal regulation, where people act to avoid feeling of guilt or shame, or to obtain contingent self-worth. Individuals start to internalize reasons for the behaviour and

no longer need external contingencies in order to engage in the behaviour; however, behaviour is still largely externally controlled. This could include people with a history of heart disease in the family who take up exercise because of anxieties about the disease.

3. *Identified regulation*- is acting as one feels the personal value and significance of behaviour are important. The behaviour has been partially internalized to a quite large degree and it is guided by personal values and self-endorsed commitments. For example, someone might exercise regularly as he/she thinks it is important to stay fit.
4. *Integrated regulation*- Integration is the process of assimilation of identified values and goals to the self. Engaging in behaviours through integrated regulation is congruent with one's sense of self, the behaviour is fully self-determined and there is no sense of coercion; however it is still externally regulated, as values with respect to certain outcomes are separate from the behaviour itself. So for example a fitness instructor might exercise as exercising is important to his/her sense of who he/she is.

As motivation is dynamic, people can move along the motivation continuum if supported by the social environment and could self-regulate their behaviour if they have more self-determined (resulting from people's own choice) motivation. The process of accepting the regulatory process as one's own is known as internalization (Deci et al., 1994). There are two processes through which individuals can internalize the regulation of uninteresting although important activities. These two different processes will result in two different styles of self-regulation. Introjection is a partial or suboptimal internalization where individuals take in a value or regulatory process, but do not accept it as their own. This results in inner regulation of behaviour where no external contingencies are needed, but individual feels pressured to behave in a certain way to avoid guilt or shame. Introjected regulation is believed to be useful as a starting point for internalization of the behaviour and will result in short-term changes; however, it can have negative effects if it persists long term (Deci et al., 1994). For example, in a study of undergraduate female students and their motivation for weight control, those with more self-determined motivation were less likely to perceive social pressure about body image. Those who exhibited introjected regulation for dietary control perceived more pressure about body image, and as a result had higher body dissatisfaction which in turn was associated with the highest level of bulimic and depressive symptoms among all regulatory types. This could reflect perceiving external pressure to behave in a certain way which was not in agreement with one's inner self (Pelletier, Dion, & Lévesque, 2004). Also, in this type of regulation one's self-esteem relies upon an

outcome; therefore, if an individual is not successful at self-regulation this might lead to negative outcomes such as low self-worth or depressive symptoms (Ryan, 1982).

Another type of internalization is integration where full internalization occurs. Individuals accept the value or regulatory process as their own and are internally valued and autonomously regulated. Individuals perform the behaviour fully volitionally because regulating is experienced as chosen and is associated with positive outcomes and behaviour is maintained over time. These predictions have been confirmed by research in the health context (Williams & Deci, 1996; Williams, Grow, Freedman, Ryan, & Deci, 1996), physical activity (Gillison, Standage, & Skevington, 2011; Pelletier, Fortier, Vallerand, & Briere, 2001) and education (Cordova & Lepper, 1996; Gottfried, Fleming, & Gottfried, 1994; Vallerand, Fortier, & Guay, 1997). For example, in a study by Pelletier et al. (2001) self-regulation and persistence was measured among 369 competitive swimmers. More self-determined forms of regulation (identified regulation and autonomous motivation) were positively associated with persistence in sport at the end of the second competitive season (at 22 months), while introjected regulation was a non-significant predictor of persistence at this stage (as introjected reasons are only temporary reasons for training). More self-determined types of motivation were associated with perceptions of the coaches' autonomy support. In another study exploring patients' motivation and behaviour of 128 patients in a 6-month very low calorie weight-loss programme, those who had more self-determined motivation to attend had better attendance and better weight loss (Williams et al., 1996). However, the motivation continuum is not a developmental continuum per se where people have to go through each stage of internalization, and it is possible for people to hold multiple motives for many behaviours (Ryan & Deci, 2002).

2.6.3 Basic Needs Theory

Self-determination theory identifies three basic psychological needs that must be fulfilled to support optimal psychological (e.g. motivation, well-being) and behavioural (e.g. performance) functioning (Deci & Vansteenkiste, 2004). The three needs are: the need for autonomy, competence and relatedness. Autonomy refers to a person's sense of volition and perceived need for agency. When actions are autonomous, individuals feel that the behaviour is an expression of the self. Autonomy is often confused with independence, which refers to not relying on others. An individual can be autonomous, even though her/his actions are influenced by external sources. For example, an individual might decide to quit smoking being influenced by the government's awareness campaign; however s/he perceives herself/himself as the origin of one's actions. The second need is the need for

competence and it refers to the experience of feeling effective in the interactions with the environment and opportunities to demonstrate one's capacities. Need for competence is facilitated by conditions that offer optimal challenges for people's skills and capacities. To be intrinsically motivated, people need to perceive themselves as both competent and autonomous. The third need is the need for relatedness and it refers to a propensity toward connectedness or belongingness with others. The need for relatedness is fostered when one feels cared for and valued by others and feels connected to significant individuals (Deci & Vansteenkiste, 2004). The need for relatedness was identified as a final need of the three needs and while need for competence and autonomy are crucial in maintaining internal motivation, relatedness plays less of a role. However, relatedness is important for internalisation of motivation as people usually internalize those beliefs that are shared by people or groups they value (Ryan & Deci, 2012).

The environment that allows the satisfaction of all three needs is considered supportive and will enable individuals to thrive (Deci & Ryan, 1991). Satisfaction of basic needs affects the type and strength of motivation, but it is important to note that each need exerts independent effects on well-being (Deci & Ryan, 2008). If needs are thwarted or neglected, it can result in the development of defences or substitutes in the form of extrinsic motives (which also have functional utility in given circumstances). For example, individuals who have not experienced support for their need of relatedness from their parents and social environments, might be more oriented towards financial success and derive their self-esteem and self-acceptance values from their public accomplishments or material possessions as these will provide a substitute for the given need (Deci & Vansteenkiste, 2004). Finally, the cross-cultural research has established that the three needs are innate and universal, and must be fulfilled to support optimal functioning, regardless of culture, gender or age (Chirkov, Ryan, Kim, & Kaplan, 2003; Sheldon, Elliot, Kim, & Kasser, 2001).

2.6.4 Causality Orientations Theory (COT)

While CET and OIT theories explain the influence of social and environmental factors on intrinsic motivation and internalization of extrinsic motivation respectively, COT (Deci & Ryan, 1985a) is concerned with individual differences in global motivational orientations. A person's inner resources are relatively stable characteristics and have been developed over time as a result of an interaction with the social context. COT distinguishes individual differences in how people orient in behavioural initiation:

1. *Autonomy orientation*- people high on autonomy orientation seek to be autonomous in the regulation of their behaviour; they regulate their behaviour based on their interests, goals and internal values.
2. *Controlled orientation*- those high on control orientation rely on external or internal controlling events, such as deadlines or rewards.
3. *Impersonal orientation*- People high on impersonal orientation are characterised by a belief that behavioural experiences are beyond personal control; they feel they are unable to regulate their behaviour which often leads to a sense of helplessness, ineffectiveness and passivity.

Autonomy orientation has been associated with psychological health and effective behavioural outcomes, while controlled regulation has been related to diminished well-being, and impersonal orientation with ill-being (Deci & Ryan, 2008).

2.6.5 The Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM)

The HMIEM (Vallerand, 2000; Vallerand & Ratelle, 2002) integrates personality, psychological and social perspectives on motivation, broadening and deepening Self-Determination theory by focusing on the importance of specificity or generality of motivational orientations, social and environmental factors operating at different levels, relations between motivational constructs and outcomes of motivational orientations. The model integrates personality, psychological and social perspectives on motivation. Motivations differ in types and levels of generality (depicted in Figure 2.2) and are characterised by four features:

1. Amotivation, extrinsic motivation and intrinsic motivation exists at three hierarchical levels of generality:
    a. The global level (personality level) - refers to a broad disposition to interact with the environment in an intrinsic, extrinsic and/or amotivated way.
    b. The contextual level (life domain level) - refers to a general orientation toward a specific life domain or context such as education or interpersonal relationships.
    c. The situational level (state level) - is a state specific measure that refers to the here and now of motivation.

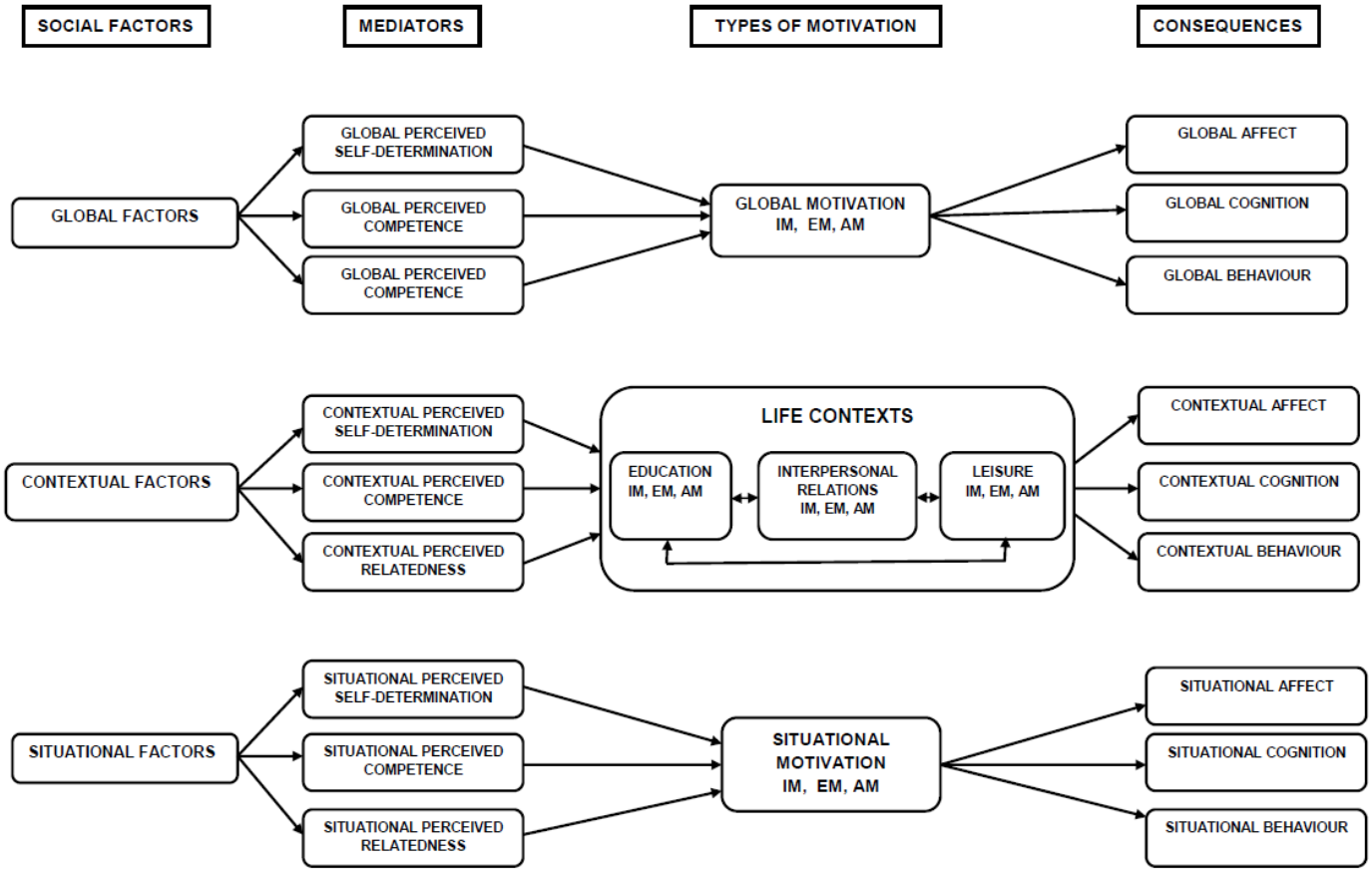
2. At each hierarchical level, social and environmental factors have a substantial influence on motivation. This influence is mediated by perceptions of autonomy, competence and relatedness. Thus for example, someone who in general enjoys exercising (global level),

might not be motivated to attend a fitness class as the instructor delivers the same, repetitive routine every week (contextual level).

3. Motivation is influenced by motivational dynamics at three levels of generality. The top down effect involves motivation at a higher level affecting the motivation at the next lower level (e.g. global motivation affects contextual and situational motivation, while contextual motivation affects situational motivation). Bottom up influence of situational motivation on contextual motivation also exists. The situational level has a recursive effect on the contextual level and global level and the contextual level on the global level.

4. Motivation is associated with important cognitive, affective and behavioural consequences that occur on the level of motivation that has produced them (i.e. global motivation leads to global consequences). Intrinsic motivation is associated with the most positive outcomes, while amotivation with the most negative ones.

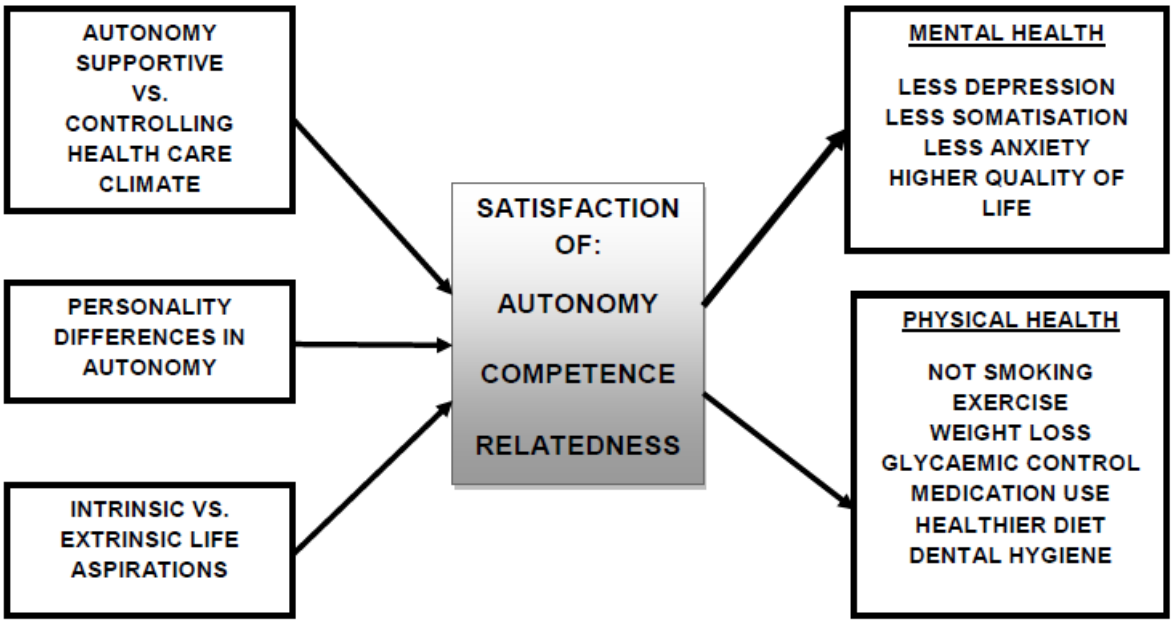
Figure 2.2 The Hierarchical Model of Intrinsic and Extrinsic Motivation



2.6.6 SDT and individual level behaviours

SDT has been developed in a cumulative, research-driven manner. The first research guided by SDT aimed to look for confirmation of SDT's basic assumptions. For example, SDT was tested in a longitudinal (6-month programme with a 23-month follow up) study of 128 patients attending a medically supervised very-low-calorie weight loss programme. The degree of a patient's autonomous motivation for participation in the programme was found to predict more regular attendance, greater weight loss during the programme and greater maintained weight loss at follow up. Participants' autonomous motivation for weight loss was predicted by individual differences (autonomy orientation) and characteristics of relevant social context (perceived autonomy supportiveness climate) (Williams et al., 1996). When it was confirmed that these assumptions appear to be true (e.g. that basic psychological needs are universal) an important development occurred- SDT was used to construct and test new treatments based on the SDT model. A schematic model of the SDT model of health behaviour change is presented in Figure 2.3 (Ryan et al., 2008).

Figure 2.3 The Self-determination theory model of health behaviour change (Ryan et al., 2008)



Weight loss

A number of large field studies and randomised controlled trials have been developed addressing weight loss based on the SDT approach to change. Silva et al. (2010) developed a weight-control intervention grounded in SDT that aimed to create an autonomy-supportive environment by manipulating the socio-environmental context. 239 premenopausal women were randomly assigned to an intervention arm (n=115, mean BMI 31.7) or to a control condition (general health education programme, n=93, mean BMI= 31.3). Women from the intervention group took part in 30 weekly or bi-monthly sessions that covered nutrition, physical activity, body image and aimed to create an autonomy supportive environment. Autonomy-supportive environment was created by promoting in participants a sense of ownership over their behaviour by encouraging choice, by providing participants with a variety of options and avenues for behaviour change (e.g. encouraging participants to find the activities they enjoyed the most). The focus of this programme was on increasing competence and internal regulation for weight control and exercise. At 12 months women in the intervention group showed more autonomous self-regulation, increased weight loss (5.6kg in the intervention group compared with -1.5 in the control group), and increased levels of physical activity (assessed as daily number of steps and minutes of moderate and vigorous physical activity).

Further, associations between general, contextual and specific measures of self-determination with psychological well-being and health-related quality of life were examined. The results showed that psychological well-being and health-related quality of life were positively related with more autonomous reasons to participate in treatment and perceived need support, while it correlated negatively with depression and anxiety. The proposed mechanisms by which this intervention promoted autonomous self-regulation for treatment and specifically for exercise, was that the treatment staff who understood the participants' perspectives, minimized pressure and control and offered participants a choice that was perceived by participants as autonomy supportive, resulting in more endorsed behavioural regulation (Paulo, Jutta, Marlene, Teresa, & Pedro, 2010). Mediators of weight loss at 12 months and weight loss maintenance at 24 months follow up were examined (Teixeira et al., 2009). 12 month weight loss was predicted by fewer exercise barriers, lower emotional eating and increased flexible cognitive restraint, while 24 month weight maintenance was predicted by exercise self-efficacy and increased flexible cognitive restraint (intrinsic motivation predicted a 24 month weight maintenance, but it was not a mediator).

Further analyses were conducted to examine predictors of maintained exercise participation at 3 years for women who took part in this study and demonstrated that autonomous regulation is critical to weight maintenance (however, the effects of autonomous regulation on weight maintenance were in 42% mediated by physical activity, so there are other factors that affect weight maintenance through alternative pathways) (Silva et al., 2011). Finally, this intervention resulted in a spill effect where general increased self-determination and motivation towards exercise were associated with improvements in eating self-regulation (Mata et al., 2009). Results of this study confirm SDT premises that postulate that development of autonomous motivation is a predictor of continued behavioural adherence. This study also suggests that application of SDT can produce successful weight loss interventions and that maintained weight loss is predicted by treatment autonomy support and the internalization of treatment goals and behaviour by making exercise and physical activity a meaningful experience.

2.6.7 SDT and policy level behaviour

SDT has been applied in studies looking at policies, but usually these have been studied at a more local level - in schools or workplaces rather than at a state or national level. The central focus in these interventions was to manipulate environmental context by modifying the instructor's behaviour so that they provide more autonomy support; therefore these studies are not direct interventions on the individual whose behaviour they are aiming to change, but interventions that aim to achieve an indirect effect (e.g. by providing teacher training). According to SDT, people function positively when others support their autonomy. Autonomy support refers to "what one person says and does to enhance another's internal perceived locus of causality, volition, and perceived choice during action" (Su & Reeve, 2011, p.160); therefore, it is not concerned with inter-personal variation in the satisfaction of basic needs, but inter-personal style of people in the position of authority and whether they take into consideration the individual perspective of people who they have authority over and to what extent they allow freedom of expression and actions (Deci & Ryan, 1987). For example, teachers that are autonomy supportive would affect the quality of a student's motivation and this in part would explain why students thrive (or not) in educational settings (the motivation of the student themself is also important) (Reeve, 2002). Experience in which people feel their autonomy is supported can be created by the presence of five interpersonal conditions: providing a meaningful rationale for doing a activity, using non-controlling language, acknowledging an individual's feeling and perspective (Deci et al., 1994), offering choices (Williams, Cox, Kouides, & Deci, 1999) and nurturing inner motivational resources (Reeve, Jang, Carrell, Jeon, & Barch, 2004). However, this

conceptual definition and conditions needed for creation of an autonomy supportive climate can differ slightly between domains. For example, in an education setting allowing self-paced learning to occur is an important aspect (Reeve, 2009), while for coaching an important element of autonomy support is providing non-controlling competence feedback (Mageau & Vallerand, 2003).

A number of interventions have been developed to train people to help them support the autonomy of others (e.g. teachers supporting autonomy of students or managers supporting autonomy of employees). Su & Reeve (2011) conducted a meta-analysis of 19 such intervention studies conducted in different domains: teachers (k=11), clinicians (physicians and counsellors, k=5), parents (k=3) and workplace managers (k=1). 16 out of 19 of these studies used at least four elements of autonomy support, with all 19 studies included providing a meaningful rationale. The majority of studies used trained raters to assess post-training autonomy-supportive behaviours directly. True mean effect sizes were calculated at 0.63. Training to support the autonomy of others was most effective for teachers and for inexperienced trainees rather than for experienced professionals and it was more effective for autonomous-oriented individuals (measured pre-interventions); however, it was also effective for control-oriented individuals but to a lesser degree (therefore a causality orientation moderated intervention effect). Among different components of autonomy support, the use of non-controlling language emerged as the most important. However, while this review demonstrated that successful interventions can be designed to help people support the autonomy of others and identify the set of conditions that allow these interventions to be most effective, it is not known how effective they would be in the real-world setting with people that have undergone such training in supporting the autonomy of others.

The effectiveness of providing such training on perceived autonomy support of people was tested in a number of interventions studies. Chatzisarantis & Hagger (2009) developed an intervention which trained two groups of teachers to deliver either an autonomy-supportive intervention associated with physical education classes that provided feedback, rationale, choice and acknowledgement of individual perspective or a less autonomy supportive intervention that only provided feedback and rationale. 215 students from 10 schools were randomly assigned to a 5 week intervention (randomisation by school). Results suggest that teachers who adopted a more autonomy supportive style were perceived by students as more autonomy supportive which resulted in more autonomous motivational orientation and higher likelihood of reporting that PE classes were enjoyable and important. An autonomous

motivation style adopted by students increased the intention to engage in leisure time physical activity supporting the possibility for transference of behaviour if an autonomy supportive climate is created. Motivational orientation towards PE classes did not change in the less autonomous condition. However, the study sample was relatively small (n=215) and the effect of the intervention on basic needs was not measured.

Tessier et al. (2010) developed an intervention for newly qualified teachers that aimed to increase three dimensions of a teacher's interpersonal style: autonomy support, interpersonal involvement (nurturing students' need for relatedness by for example being sympathetic and warm) and structure (the extent to which a social context is structured, predictable, and consistent). Results showed that intervention fostered positive changes in the teacher's inter-personal style (all three dimensions were improved). However, while the study hoped to achieve increases in students' self-determined motivation by increasing the teacher's autonomy supportive behaviour, no increases in self-determined motivation were observed as a result of improvements in the teacher's interpersonal style (only reduction in students with low self-determined motivation) - possibly because changes in teachers' behaviours were not sufficiently large and one of the teachers did not manage to change his behaviour as much as the other two teachers did. Although the intervention showed promising results it was delivered among an extremely small sample - 3 teachers and their 185 students.

Cheon et al. (2012) assessed the effectiveness of an intervention that aimed to train PE teachers to be more autonomy supportive during classes. It was delivered among 19 secondary school teachers and included 3 part training (reflection on own teaching style, learning autonomy supportive style and behaviour and discussion about concerns and difficulties). Intervention was delivered among 1430 students randomly assigned to an experimental or a delayed-treatment control group. Intervention was successful at teaching teachers how to be more autonomy supportive towards their students as observed by trained raters and by students' self-completed measures (they perceived their teachers as more autonomy supportive). Students of the teachers in the experimental condition showed mid-semester and end-of-semester improvements in self-reported autonomous motivation, basic need satisfaction, amotivation, classroom engagement, future intentions, academic achievement and skill development. Multilevel equation modelling showed that these changes were attributed to the teachers satisfying the students' basic needs. However, it is not known to what extent changes in the teacher's style were sustained over time and it is not known whether students of the teachers in the experimental condition increased their participation in the leisure time physical activity as a result of experiencing an autonomy

supportive style. Therefore, the results of these studies demonstrate that physical education teachers or exercise instructors can learn how to be more autonomy supportive, which in turn would increase need satisfaction among their students, who would also become more autonomously motivated and show meaningful improvements in terms of their motivation and indices of physical activity.

The research presented above suggests that SDT is a popular approach for the development, implementation and evaluation of theory-based interventions which address motivational dynamics of health behaviours. Recently a systematic review has been conducted to assess how adequately it has been applied in physical activity, dietary behaviour and weight management domains (Silva, Marques, & Teixeira, 2014) according to the criteria from the Theory Coding Scheme (TCS; Michie & Prestwich, 2010). 18 unique trial were included and result demonstrated that all trials targeted SDT related constructs; the majority linked behaviour change techniques to underlying SDT constructs and assessed these constructs pre and post interventions using measures of adequate reliability and validity. However, in a large number of these studies this measurement was limited to SDT motivational dynamic constructs (such as changes in autonomous motivation). Only two of the included studies conducted formal mediation analyses, which is an important limitation as the use of mediation analysis allows a causal mechanism of change to be assessed and without such analyses it cannot be established whether the changes observed were due to processes specified by the theory (Michie & Prestwich, 2010). What is more, the majority employed a quantitative methodology and used self-reported measures (e.g. measuring change in perceived competence in physical activity). Therefore a number of improvements in intervention using SDT as a theoretical framework could be implemented. These improvements include the use of longitudinal data which could determine whether motivation changes over time and the greater use of mixed methods approaches which would enable not only quantitative changes in motivational constructs to be assessed , but also elicit insight into participants' perspectives.

2.6.8 Why is SDT appropriate to apply to obesity research?

Self Determination theory appears useful for understanding motivation and adherence to health behaviours, and among these to obesity research. Firstly, the effectiveness of obesity policies will depend on how these measures are successful at affecting individual level behaviour (improved nutrition and increased levels of physical activity) (Halpern et al., 2004). According to SDT, people's motivation is a primary determinant of behaviour, thus by addressing it changes in behaviour can be achieved. This is in contrast to many

psychological theories of behaviour change which specify pre-determinants of motivation or intention that have to be addressed to result in a behaviour change (e.g. perceived threat and outcome expectancies in Health Belief Model, Janz & Becker, 1984; or attitudes, subjective norm and perceived behavioural control in Theory of Planned Behaviour, Ajzen, 2011). SDT is based on a concept that the quality of motivation rather than its quantity, amount or intensity determines people's behaviour. This would suggest that higher amounts of motivation would not translate into optimal outcomes as specified by many psychological theories, which view motivation as a unitary concept (e.g. Expectancy-value Theory, Eccles & Wigfield, 2002) .

Research grounded in SDT has highlighted where interventions could be best directed in terms of precursors to motivation and behaviour. As new, healthier behaviours might not be enjoyable, SDT might be helpful in planning interventions that will help people internalize the new, changed behaviour (behaviour internalization) so that external contingencies are no longer needed (Sheldon, Williams, & Joiner, 2003). SDT specifies mediators and moderators of intervention effects (Deci & Ryan, 2002), which have been operationalized so SDT offers suggestions for specific strategies (e.g. how an autonomy supportive climate can be created) (Deci et al., 1994). This is in contrast to many theories of behaviour change which provide information on constructs that need to be changed for the behaviour change to occur, but do not offer guidelines on how it can be achieved (Brug et al., 2005). In addition, SDT might help explore how current policies to promote physical activity and a healthy diet are perceived and interpreted with respect to motivation for behaviour change, which in turn might help policymakers understand how to bring about a behaviour change. Past work using SDT has demonstrated that the way policy is perceived by the public affects people's motivation to comply with a policy and as a result change their behaviour (Moller, Ryan, & Deci, 2006). Some measures might not be perceived positively by those affected, and the policy might even have the opposite effect to that intended. For example, a study by Legault et al. (2011) compared two types of motivationally-based prejudice reduction interventions and demonstrated that the intervention that stressed the societal needs to control prejudice resulted in increased prejudice, while the intervention that promoted autonomous motivation resulted in reduced prejudice. The possible mechanism for the counterproductive effect of the strategy that stressed external control proposed by the authors was due to the threatened autonomy of participants.

In addition, for successful behaviour change, not only is adoption of a new health behaviour crucial, but also its maintenance which might be more difficult to achieve than short-term changes (Jeffery et al., 2000; Wing & Hill, 2001). According to SDT, maintenance of a new

behaviour requires internalization — a process where people endorse the value of a new behaviour, accept the regulation of this behaviour as one's own and develop a sense of competence for behaviour maintenance (autonomous self-regulation and perceived competence). According to SDT premises, a process of internalisation is active and gradual where individuals travel along the motivation continuum towards more internalised motives of behavioural regulation; however, they do not need to internalise the message entirely to have an internalised behaviour regulation (Williams et al., 2011). Therefore, someone might eat a low fat diet as s/he thinks good health is an important value.

2.6.9 Criticism of Self Determination Theory

Self Determination Theory has been criticised for implying that people perform conscious behaviour and for not taking into account habits and automatic behaviours (Schwartz, 2000) that are particularly important in eating behaviour. For example, Strack and Deutsch (2004) argue that all human behaviours are a joint function of reflective and impulsive mechanisms. Thus even someone who attempts to lose weight as it is personally important to them (identified regulation) or congruent with their values (integrated regulation), may be driven by an impulse and buy a bar of chocolate and eat it (Strack, Werth, & Deutsch, 2006). However, Ryan & Deci (2002) argued that SDT has been informed not only by humanist concepts (people searching for self-integrity), but is also rooted in developmental and organisational biological perspectives and has links with the evolutionary and dynamical systems theory. Therefore SDT recognises that people have innate tendencies towards growth and integration, while acknowledging the strong influence of biological drivers such as hunger and the influence of the social environment.

Another criticism concerns the inclusion of the three basic needs. Pyszczynski, Greenberg, & Solomon (2000) argued that the three needs are too general, while Bauer and McAdams (2000) argued that these needs are not in fact fundamental, as they are not observed in life stories (a narrative approach to understanding human behaviour and experience). Another criticism concerning basic needs was that the need for autonomy cannot be considered a need and is only present in Western societies (Carver & Scheier, 2000). However, research conducted in a Former Eastern Bloc Country seems to counter that argument. A study by Deci at al. (2001) showed that task engagement and psychological adjustment of employees in state-owned companies in Bulgaria were predicted by satisfaction of the three innate needs, which in turn was predicted by the autonomy- supportive work climate. This study supports the model derived from the SDT and supports the notion that basic needs

are universal and cross cultural and that they must be fulfilled to support optimal functioning (Chirkov et al., 2003; Ryan & Deci, 2000b; Sheldon et al., 2001).

SDT addresses behaviours that are intrinsically motivated, but also behaviours that are not interesting or enjoyable and might even be aversive. However, Pyszczynski et al. (2000) argue that SDT is too idealistic and does not account for the 'darker side' of human nature such as prejudice, anger, manipulation of others or hostility. Ryan & Deci's (2000a) response to this criticism was that when basic needs are thwarted it would result in 'the darker side' phenomena such as violence or mental illness. For example, eating disorders such as anorexia nervosa arise due to disturbances in the development of autonomy-related issues (e.g. a more controlling style of self-regulation compared with controls) (Strauss & Ryan, 1987). SDT has also been criticised for being too politically correct as it focuses on morally desirable goals such as attaining well-being, while in the spread of capitalism and consumerism, extrinsic motivation which might not always be morally desirable, would become more important for the majority of people (Buunk & Nauta, 2000). Finally, some authors have argued that SDT is tautological (for example the basic need concept is used to explain well-being) and non-falsifiable as it is concerned with people's perceptions of need satisfaction (e.g. feeling autonomous) rather than actual need satisfaction (i.e. being autonomous) (Buunk & Nauta, 2000). Therefore, it might not meet criteria that theories have to fulfil such as falsifiability (Popper, 2002).

All this criticism shows that SDT is not without its flaws; however, the aim of the current thesis is not to provide support for SDT, but to establish whether it could help us understand the impact of health policy on motivation. The main reason for the use of SDT in the current thesis is the issue of control. Target behaviours of obesity policies (i.e. healthier diets and higher levels of physical activity) and the way policies addressing these two behaviours are introduced can affect how motivation for the behaviour would be perceived by policy recipients (controlling vs. autonomy supportive). SDT is well established at describing how controlling environments can undermine motivation (Deci & Ryan, 2008), therefore it may be useful as a means of understanding people's responses to public policy.

Overview

This literature review has drawn together findings from social policy and health psychology to provide a background for exploration of the potential for applying some of the lessons learned from the UK's successful tobacco control approach to combating obesity. It has been shown that there is a growing consensus that the obesity epidemic that has occurred

over the past three decades has resulted from the changing environment that encourages energy consumption and discourages energy expenditure, rather than biology (Hill et al., 2003). Therefore, there is a potential to reverse the obesity trend by introducing policies that target this obesogenic environment. Although currently a wide range of obesity policies are in place, they tend to focus predominantly on childhood policies and include initiatives such as the promotion of breastfeeding or school lunches standards and there has been little systematic attempt to understand how these measures introduced at a policy level affect changes in the obesity prevalence (Jebb, Aveyard, & Hawkes, 2013).

Over the past 50 years significant achievements have been made in tobacco control in the UK and some authors have suggested the translation of the evidence to combating obesity. However, little is known regarding tobacco control policies action (i.e. why and how they exert their effects) and how well these would translate to another context. Therefore although the rates of smoking in the UK have dropped in the past 40 years by 25% (from 45% of all adults being smokers to 20%, ASH, 2014), suggesting that policy interventions are successful in tackling smoking, it is not understood why smokers have responded to the legislation in this way. Identifying underlying causal mechanisms could be enhanced by the use of a behaviour change theory (Michie & Prestwich, 2010) as it may help understand the process by which such policies have exerted their effects (Hardeman et al., 2005). Therefore, more theory-based research in both tobacco control and obesity policy research is needed as it might permit the detailed analysis of mechanisms of policy effect on individual level behaviour and this would increase opportunities for learning.

SDT was selected as an appropriate theoretical model to be used in the current thesis as it illustrates a causal link that provides a coherent explanation of behaviour change that takes into account the influence of the wider social context. As such it provides a structure on which to build an interdisciplinary approach combining health psychology with social policy, and a strong theoretical foundation from which to explore the mechanisms of effect of social policies on health behaviours. The starting point for this thesis is based around the concept that need-supportive environments can be facilitated at multiple levels, to include the policy level, and that we can therefore scrutinise whether obesity policies are designed and/or implemented in a more or less autonomy supportive way (and experienced as control) and generate hypotheses about their potential effects as a result. For example, policies that are perceived by the public to be pressuring individuals to behave in a certain way, or are controlling, would be expected to result in less-self determined forms of motivation. While a number of studies have demonstrated that provision of support for basic needs by

instructors is a modifiable behaviour, less attention has been afforded to whether the creation of an autonomy supportive climate can be achieved within social level interventions where there is no direct contact between the ‘person’ in the position of authority and the recipient. The following four studies will use a mixed methods approach and aim to answer the overarching research question of this thesis which is the exploration of motivational responses of individuals to tobacco and obesity control policies. SDT will be used as a tool to help interpret the findings, and explore the potential for translating some of the lessons from tobacco into the obesity context.

CHAPTER 3: Similarities and differences in individuals' perceptions regarding pubic policies associated with smoking and weight control behaviours.

3.1 Introduction

As discussed in Chapter 2, the reduction in smoking rates in the UK has been declared one of the greatest achievements of public health of the 20th century (Lewis et al., 2005). A review of possible determinants responsible for this success concluded that with the exception of pricing (which is the single most successful tobacco control strategy; Chaloupka, Straif, & Leon, 2011), the impact of each of the components of the comprehensive tobacco strategy has been enhanced by the existence of other programmes. As the introduction of tobacco control has been so effective in reduction of the smoking rates (Lewis et al., 2005), many researchers recommended that lessons could be drawn from the tobacco experience for the organisation of more successful obesity control (Dorfman et al., 2004; Engelhard et al., 2009; Garson & Engelhard, 2007; Green et al., 2006; Mercer et al., 2003; West, 2007; Yach et al., 2003; Yach et al., 2005). However the evidence from the tobacco context cannot be directly transferred by the simple imitation of apparently successfully approaches as there are a number of inherent differences between smoking and behaviour associated with obesity (i.e. physical activity and eating behaviours) (discussed in more detail in Chapter 2).

The translation of the evidence between domains in further hindered as our understanding of people's motivational responses to legislation is limited. This in part arises due to the lack of attention in policy evaluation research on the individual effects of policies on motivation, where research on tobacco has mostly focussed on assessing the effectiveness of these in terms of reducing smoking rates, for both existing measures (e.g. Fong et al., 2006; Hackshaw et al., 2010) and future proposed approaches (e.g. Germain, Wakefield, & Durkin, 2010; Thrasher, Rousu, Hammond, Navarro, & Corrigan, 2011). For example, a recent evaluation of the impact of tobacco control mass media campaigns on quit attempts and reduction in smoking prevalence estimated that the suspension of such campaigns in England in April 2010 has significantly affected quitting activity as evidenced by the significant reduction in the number of quitline calls and requests for cessation support packs (Langley et al., 2014). Although this study managed to separate the effects of mass media campaigns from other elements of tobacco control and emphasized the important role that such campaigns play in comprehensive tobacco control programme, it has not offered the

mechanism of action of such campaigns on individual motivation and behaviour. Therefore it is not known why smokers responded in this way (i.e. why fewer people called the quitline).

Not least as new policies and enforcement practices are often introduced as part of a comprehensive set of measures, so they are not likely to be experienced as separate, but perceived as a policy climate (Forster et al., 1998). What is more, Chapman and Freemen (2008) argue that a steady decline in the number of smokers over the past 40 years has not only been achieved as a direct result of tobacco policies such as higher cigarette price or restrictions on the age of purchasing cigarettes, but also as a result of the cultural change in the meaning of smoking (for example how smoking and the tobacco industry are being portrayed in the media in a negative way). Thus, the way smoking behaviour and norms regarding smoking are changing might not be captured in studies that assess the effectiveness or perceptions of tobacco control when initiatives are considered in isolation.

Similarly, little is known about obesity policy action on individuals' motivation and behaviour. The majority of studies exploring policy climate among individuals who those policies affect have used surveys to explore support for obesity policies concerning adults (Barry, Brescoll, Brownell, & Schlesinger, 2009; Chambers & Traill, 2011; Emm, Gillison, & Juszczyk, 2013; Hilbert, Rief, & Braehler, 2007; Oliver & Lee, 2005). However, these studies have asked respondents about their general support for obesity measures rather than asking them what they think would help them to control their weight. For example, in a study by Chambers and Traill (2011), 500 British adults were asked about their support for different policy interventions. Overall, child-focused interventions received the highest level of support; while for interventions targeting adults, support was dependent upon beliefs regarding the causes of obesity. Those who felt obesity was caused by personal failing were less likely to support any type of intervention, while those who felt obesity was attributed to factors beyond personal control such as high availability of unhealthy food were more likely to support policy interventions. However, the paper did not state the proportion of adults who supported the introduction of interventions and the numbers that were opposed; therefore, it is not known whether there was support for the state action on obesity. Similar results were obtained in a study conducted among young Canadian adults (n=521), where measures that did not require an increase in tax (i.e. compensatory policies) had the highest support. Support was also high for redistributive policies, in particular those targeting children such as summer camps for healthy living. Price-raising polices had significantly lower support (Lange, & Faulkner, 2012). Taken together, the findings of these studies suggest that the public supports policies that do not have a direct impact on adults' dietary or physical activity habits (such as those focusing on childhood obesity) and ones that take

a benign approach and do not require higher taxes (such as food labelling) (Diepeveen, Ling, Suhrcke, Roland and Marteau, 2013).

Research evidence concerning views of overweight people on what could help them control their weight in terms of measures introduced at policy level is very limited. The single study that could be identified reported on interviews conducted with 34 self-identified overweight British adults about their views on effective obesity interventions, which were compared and contrasted with the views of health professionals and policy makers (Greener, Douglas, & Van Teijlingen, 2010). This was the first study that asked overweight individuals what they thought would help *them* lose weight rather than asking about general support for different policy measures. Participants were eager to try methods they had tried in the past or methods that they still wanted to try such as a new diet. They emphasised the importance of regular and long-term support, both from health professionals as well as friends and family. Participants did not discuss environmental policies, although they acknowledged environmental factors as important influences on weight gain or as important barriers to weight loss. Health professionals believed obesity to be determined by biological and socio-ecological factors and felt that obesity approaches should focus on interventions encouraging lifestyle changes and health service reform. Policy makers attributed obesity to environmental causes and felt that obesity can be successfully tackled by the introduction of a comprehensive approach (a range of strategies at different levels); however, they were frustrated by the lack of clear evidence supporting any of these interventions. Therefore, findings from the studies discussed above suggest that lay members of the public, health professionals and policy stakeholders tend to hold divergent perspectives on possible solutions to obesity. Although the study by Greener et al. (2010) was an important step in exploring the views of those who find it difficult to maintain or lose weight, it focused heavily on weight management interventions. Therefore, there are no studies exploring the obesity policy climate (i.e. existing approaches to obesity and hypothetical future measures) from a policy recipient perspective.

The first step in understanding individuals' motivational responses to tobacco control and obesity policies is the exploration of the link between the individual's attitudes, support for such policies, and subsequent motivation for behaviour change in response to the legislation. The rigour of processes to investigate such links is strengthened by the use of a conceptual framework (Michie & Abraham, 2004). Arguably, the success of both tobacco control and obesity policies will in large part depend on their ability to motivate individuals for behaviour change, rather than result in indifference or reactance. A framework that has proven useful in theorising how environments (e.g. policy initiative) can foster or undermine

motivation for behaviour change is SDT. According to SDT, policies addressing smoking, healthier diets and/or physical activity can be introduced in a way that enhances or diminishes autonomous motivation (Deci & Ryan, 2008). Although approaches which are perceived as controlling (e.g. threats of punishment) can be successful in bringing behaviour change, the behaviour is less likely to be maintained as people follow the policies to avoid punishment rather than being guided by their own interest or values (Deci, Eghrari, Patrick, & Leone, 1994). SDT has been implemented previously in studies exploring the effects of policy on motivation for behaviour change and provided insight into the mechanism of policy action (Moller et al., 2006). For example, a study by Emm et al. (2013) explored support for obesity related policies and its association with motivation for weight control among a sample of British adults. Although individuals in this study supported the introduction of obesity policies, obesity policies did not appear to promote autonomous motivation for weight control and were seen as controlling. This might suggest that although British adults recognise that obesity poses a serious public health threat, they have not internalised the rationale for weight control and act through extrinsic motives. Therefore the SDT framework might offer a useful perspective for the current research topic.

As discussed in Chapter 2 (Section on denormalisation of smoking), advances in tobacco control policy over the last 50 years have been credited with much of the success of the reduction in smoking prevalence and the denormalisation of smoking in the UK over this period (Poland et al., 2006; Ritchie et al., 2010a). The aim of conducting a study with smokers and former smokers is to explore to what extent smokers' views reflect this inference, in terms of to what extent smokers themselves attribute the denormalisation of smoking to policy level initiatives in contrast to other factors (such as family pressure to quit smoking). Their views will provide insight into how responses to policy are incorporated into people's narratives about their motivation towards a particular health behaviour. The themes underpinning the views of smokers will then be compared with views of people who are trying to lose weight about the policy environment surrounding obesity-related behaviours (i.e. physical activity and a healthy diet). The policy environment surrounding obesity is much less advanced than that of tobacco control (West, 2007), and unlike for smoking, the social environment surrounding the behaviours implicit in the development of obesity (physical activity and a healthy diet), is not normalised in favour of supporting healthy behaviour (i.e., the environment is obesogenic; Omoleke, 2011). Collecting this comparative information from two contrasting domains in one study was undertaken to facilitate the identification of key factors on which the two differ, and to start to draw practical policy implications for further investigation. Doing so from a theoretical perspective, through exploring the constructs underpinning motivation and its determinants relevant to SDT,

further enhances the potential for this work by providing insight into the mechanisms of effect, links to the extant literature, and the potential implications for individual behaviour change.

3.1.1 Research questions

The current study aimed to explore the following questions:

1. What are the views of smokers and former smokers on existing and hypothetical future tobacco control policies?
2. What are the views of individuals who find it difficult to control their weight on existing and hypothetical future obesity policies?
3. What impact do these individuals feel these policies have on their motivation for behaviour change and how differences in the way policies are perceived can influence people's responses to them?
4. Are there similarities and differences between people's views in relation to their health behaviour associated with smoking and weight control (eating and physical activity) with respect to public policy changes?

3.1.2 Design of the study

Paradigm of inquiry

A paradigm of inquiry has three components: methodology (the chosen research strategy/ how the researcher should go about finding out knowledge), ontology which is concerned with the nature of the world and what we can know about it; and epistemology (how it is possible to know about the world). Each of these will now be discussed in turn.

Research methodology

As described in the introduction, there is limited research reporting on the views of people who are trying to change their health behaviours, whether smoking or behaviours related to weight loss, and the policies that are aimed to help them. As such, an exploratory qualitative approach was taken to contribute towards this gap in the literature. In-depth semi-structured interviews were chosen as they allow the researcher to hear what the participants have to say on the topics (questions from the fixed interviews script), but they also enable the interviewer to improvise on follow up questions and explore further meanings and areas that emerge during the interview, allowing for a greater depth of answers (Legard, Keegan, & Ward, 2003).

Ontological position

The three main philosophies of science are positivism, also known as naïve realism (including post-positivism), social constructionism and critical realism. Positivism developed from the empiricist tradition views the world as a single reality that is independent of human cognition and perception, in which reality can be explored through rigorous scientific methodology. Post-positivism rejected the positivist view that reality is independent of the researcher and the phenomenon studied, therefore pure objectivity is impossible— however research statements should be empirically verifiable. Traditionally, positivism and post-positivism are linked to quantitative methodology where objective and non-biased data collection is emphasized (e.g. hence the use of double blinded randomised controlled trials). In contrast, according to social constructionism the reality, as the name suggests, is socially constructed and the aim of the researcher is to explore how this construction of social phenomena happens (Madill, Jordan, & Shirley, 2000). The third main philosophy of science is critical realism that criticizes both positivism and social constructionism approaches for being too superficial and anthropocentric (interpreting the world in terms of human values and experiences). According to critical realism, a world independent of human beings exists, however there is no way to prove or disprove this assumption and researchers behave as if this assumption was true (Gorski, 2013).

The three approaches discussed above represent the three main approaches to ontology, however other approaches also exist. None of these three main approaches was considered appropriate for the current study due to the topic/nature of the study. This study was based on a number of research and theoretically-informed assumptions:

1. That people would have different experiences and responses to the same policy and that different people might perceive the same social context differently (Deci

& Ryan, 2002). As such, positivism was not appropriate as it assumes one single reality.

2. That there is a world independent of human beings which includes tobacco control and obesity policies. As such, constructionism is not appropriate as this philosophy argues against the notion that any structure within the society exists (Houston, 2011).
3. Participants' narratives about what they believe to be the true world are not naïve. As such, critical realism might not be applicable to the current study as it assumes that "to speak or desire to speak about the real world is either naive or meaningless" (ICCR).

Subtle realism which views reality as filtered through various 'lenses' was chosen as the philosophical stance for the current research as it offers a useful research perspective. Within subtle realism reality is seen to exist independently of researchers; however, researchers do not have direct access to the phenomena that they investigate as there is no certain knowledge of the world (Hammersley, 1992 as cited in Snape & Spencer, 2003). Reality can only be accessed via the subjective interpretations of a respondent's understanding of reality, and thus researchers aim to access participants' accounts of the phenomenon. It is then understood that a participant's perspective on reality is further interpreted from the researcher's perspective, which is influenced by the researcher's socio-cultural location (Belk, 2007).

Applying subtle realism to the present study

According to the subtle realist paradigm, the description of social reality represents reality (rather than reproduces it); thus in the present example, the social reality of interest was the participants' experiences of the influence of obesity and tobacco control policies. In order to elicit participants' ways of perceiving social policies, the interview guide was developed to ask questions that assumed such policies represented a predetermined outside reality, that is, that they exist independently of any person. Interview responses were analysed using thematic analysis, as this approach is not tied to any specific pre-existing theoretical position (Braun & Clarke, 2006), and is thus compatible with subtle realism. The research paradigm also influenced the approach taken to establish the trustworthiness of data, which is described in the section *Demonstrating rigour in the current study.*

Epistemological position

Epistemology is concerned with the nature of knowledge and how valid knowledge can be obtained. A range of epistemological positions exist and include: objectivism, constructivism and subjectivism (James & Busher, 2009). Objectivism, which is linked to a positivist stance,

applies the methods of natural sciences on the assumption that valid knowledge and objective truth about the world can be discovered in that way. In contrast, constructivists reject the objectivists assumption that the world and truth exist, but posit that meaning is constructed. The third epistemological position of subjectivism is a denial of reality, which assumes that meaning is imposed on the object by the subject as all knowledge is generated from the mind, starting from private sensations, attitudes etc. The ontological position adopted for the present study is not well supported by any of these three main epistemological positions, as such:

1. Objectivism is not appropriate as it uses the methods of natural sciences such as laboratory experiments to the study of reality as it assumes that with the use of such methods one objective truth can be discovered (James & Busher, 2009).
2. Constructivism might appear suitable as it assumes that researcher and participants construct the knowledge together, however constructivist epistemology is not aligned with the ontological perspective of this study.
3. Subjectivism does not appear to be suitable for the current study as this particular epistemological position challenges the idea that any knowledge or understanding of human experiences can be transmitted in a tangible form (Morgan & Smircich, 1980).

As presented above, none of the three described epistemological approaches appeared to be suitable for the current study. Based on the research topic and chosen methodology, the working paradigm selected was pragmatism (Cherryholmes, 1992). The pragmatist perspective recognizes that research occurs in many contexts (social, political, historical etc.), and that the relationship between the inquirer and the inquired depends not only on factors traditionally recognized as epistemic such as what kinds of knowledge are possible, but also on pragmatic factors such as time constraints. The pragmatist perspective gives primacy to the research question, thus allowing for the most appropriate method or a mix of methods to be employed to address a specific research problem regardless of its epistemological derivation (Creswell, Klassen, Clark, and Smith, 2010).

Demonstrating rigour in the current study

All research studies, including quantitative and qualitative studies, should be evaluated in terms of the rigour with which they were conducted, as this process helps to assess whether the study findings are accurate and whether the conclusions reached are sound (Long & Johnson, 2000). Traditionally in quantitative methodology, such evaluations were assessed in terms of the study validity, reliability and generalizability. However, this approach is deeply rooted in a positivist approach and it has been argued that for qualitative research

alternative criteria for evaluation are more appropriate as they better reflect the interpretative nature of qualitative studies (Guba & Lincoln, 1989, p. 242). These criteria are: trustworthiness or credibility (rather than internal validity), transferability (rather than generalizability/ external validity), dependability (rather than reliability), and conformability (rather than objectivity) (Lincoln & Guba, 1985).

Trustworthiness of Data

Credibility/ trustworthiness in qualitative research is concerned with the issue of whether the study has accurately recorded the reality and whether the findings are congruent with the reality (Lincoln & Guba, 1985). Using a research method that is well established can assist in generating findings that are credible (Shenton, 2004). With this in mind, Thematic Analysis was used in the current study as it is widely used in the field of health and health promotion (Smith et al., 2013; Stanners, Barton, Shakib & Winefield, 2014; Tierney & Fox, 2010). Another strategy to ensure credibility is the use of triangulation via different data sources (Golafshani, 2003). This can be approached by including participants with differing experiences, as the recruitment of a diverse sample offers an opportunity to check credibility of information across informants (Shenton, 2004). The present study ensured that participants with different experiences were represented by a purposeful sampling strategy, whereby for exploring perceptions of tobacco control policies both current and former smokers were interviewed, and for exploring perceptions of obesity policy, people with a range of healthy and overweight body sizes and those who were both successful in controlling weight and those who were not, were all included. Finally, credibility can be improved by the critical reflection of the researcher's and participants' characteristics that could have influenced the way in which data was collected or interpreted (Mays & Pope, 2000). The way in which this process was facilitated is discussed in more detail in the reflexivity section.

To further ensure trustworthiness, the themes that emerged were discussed with the principal supervisor to check that themes were reasonably supported by the data - particularly in relation to theoretical constructs, as the supervisor is more familiar with Self Determination theory. The supervisor has also extensive experience in the tobacco research area as she has been working as a research health psychologist delivering smoking cessation treatment for three and a half years. In line with a subtle realism perspective in which participants are viewed as active contributors to our emerging knowledge, respondent validation was sought among study participants to check whether the interpretations made were viable (Bloor, 1978; Lincoln & Guba, 1985).

Transferability of findings

A concept of transferability (generalizability) can be applied in a number of ways to qualitative research. One such way is to provide an accurate and detailed description of the research process, a so called 'thick description' (Lincoln and Guba, 1985). For example, this could include giving full details of the sample and variety of participants, demonstrating how the data analysis was conducted to show how the conclusions have been arrived at, and providing a clear description of themes and sub-themes that were identified (Lewis & Ritchie, 2003). Describing the research process in detail helps others to evaluate whether the conclusions drawn can be transferred to other contexts or people. A detailed description of the study process is provided below.

Dependability of findings

Dependability (reliability) in qualitative studies can be enhanced by providing a description of the research process in a systematic way, demonstrating that the interpretations and inferences drawn are supported by the data (Lewis & Ritchie, 2003). Dependability can also be enhanced during the data collection stage by asking participants for clarification to avoid any misinterpretation or bias (Shank, 2006). Throughout the current research process the possibility of misinterpretation or bias was minimised by the use of a consistent approach (e.g. the use of an interview schedule), asking for clarification during interviews and the discussion of interpretations with the supervisor, comparing the findings to the existing literature and finally, presenting and discussing the findings with other researchers from tobacco and obesity fields during scientific conferences.

Conformability and reflexivity

The rigour of qualitative research should always be examined in the light of the researcher's personal worldview, and reflexivity can help to acknowledge such influences. Reflexivity is a process which involves reflecting critically on how the researcher's own perspective, knowledge, social background and assumptions shape the process and outcome of research (Alvesson & Skoldberg, 2000), and should include the examining of the researcher as well as the research relationship (Cho & Trent, 2006). Thus, reflexivity can also be used to increase, conformability, the degree to which research findings are shaped by participants' views rather than the researcher's bias. This view arises from the critique of the scientific objective view and argues that data are results of the interpretation and they cannot exist independently of the researcher. In reflecting on the impact of the researcher in the present study, the following factors were considered: (i) that the researcher had some experience in qualitative data collection and analysis, having previously conducted and analysed results of a study concerning sensitive topics such as gynaecological cancers, (ii) that the researcher's personal characteristics may have influenced how participants responded to her, and how she responded to participants and interpreted the findings. In the present case, the researcher was a non-smoker with a BMI within the healthy weight range.

One way of facilitating critical reflection is doing a reflexivity exercise where the researcher reflects on his/her assumptions regarding the research topic, his or her personal experience, disciplinary background and the wider sociocultural context prior to the start of the study (Braun & Clarke, 2012). This was done in the present study by keeping a journal where the assumptions that the researcher held about the topic were written down before the data collection. The notes were revisited during data analysis to observe whether personal biases had changed during the course of the study, and whether they might have influenced the interpretations. In analysing the data collected from the tobacco control interviews, a useful exercise for reflexivity was attending the smokers' panel meeting before collecting the data. This provided a chance to hear a wide range of participants' opinions and perspectives on tobacco control policies and helped to expand the researcher's understanding of potential smokers' perspectives, and challenge some of her initial assumptions and opinions regarding tobacco control measures before embarking on one-to-one interviews.

3.1.3 Analysis

Theoretical thematic analysis (TA) which is “a method for identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke, 2006, p.79), was chosen as the analytical method for the data. Although there are other apporches to qualitative data analysis that also aim to illustrate patterns across the data such as Interpretative Phenomenological Analysis (IPA) or Grounded Theory (GT), thematic analysis was judged to be the most suitable. Firstly, TA is not bound to any particular theoretical framework and is compatible with phenomenological approach taken. In addition, the main goal of conducting GT analysis is to generate a theory of the phenomneon studied (Strauss & Corbin, 1990) which was not the aim of the current study, while IPA is used to explore individuals percpetion and is concerned with a detail analysis of cases (Smith & Osborn, 2003), therfore might not be an appropriate aproach for a study that aims to make comparisons between contexts. What is more, for conducting both IPA and GT detailed theoretical and technical knowledge of these approaches is required (Larkin, Watts & Clifton, 2006), and although the researcher has some experience in conducting qualitative research, TA may provide a safer option for a relatively inexperienced researcher. Thematic analysis also appears appropriate as the research topic of the current study is under-researched area, therefore the use of TA will not only provide a rich description of the data set, but also provide links between themes which enables the development of claims in relation to data (Braun & Clarke, 2006). Finally, as reserachers who use TA are urged to make the process of doing the researcher transparent therefore it would be easier to compare the results with other studies.

An inductive approach to data analysis was taken, where the analysis was concerned with understanding each individual’s experience of tobacco control or obesity policy. Although the interview guide contained questions that were tapping constructs from SDT such as the issue of control, the data analysis was guided by the emergent themes rather than SDT and it was not constricted to the codes or themes related to SDT issues. SDT was applied only after the initial themes had been developed (in the Discussion section), to reflect on whether constructs relevant to SDT were introduced by participants, and if the application of the theoretical framework could provide additional insight into the potential links to past work and implications of study findings.

The two populations (smokers, and people trying to lose weight) were analysed separately following the same approach. The steps taken in data analysis were as follows. Step one was transcribing (or checking the transcripts) in order to become familiar with the data. Step two involved re-reading the interview transcripts, taking notes and marking ideas for coding. This was done in an active way, searching for patterns and determining what is interesting about the data. Step three involved the generation of initial codes. These three steps of the analysis were done manually using colour pens to indicate potential extracts and patterns. At this stage as many potential patterns were identified as possible, some of which were possibly not relevant to the research questions (for the initial themes and sub-themes identified in Phase 2 see Appendix 3.10), however they were all kept. A thematic map was produced containing potential clusters and codes they contained (for a map produced during Phase 1 see Appendix 3.11). The next stage (Step 4) used NVivo software and involved sorting different codes and looking at whether any clusters might create a theme. A coding sheet was constructed for each participant, to note all possible themes and sub-themes within each interview to facilitate the search for patterns.

Once the thematic analysis had been conducted, the content and pattern of themes were explored relative to motivational constructs. This was done by examining participants' accounts of how they believed that different aspects of the social environment (including the policy environment) contributed to their overall level of autonomous/controlled motivation. First, participants' quotes supporting each theme were examined to establish whether they tapped the basic tenets of SDT such as controlled or autonomous motivation, basic psychological needs or extrinsic versus intrinsic goals; for example, by participants discussing their particular rationale for behaviour change, or whether they felt their feelings and needs were acknowledged. This also involved examining the language used, whether it reflected perceptions of pressure or demands (such as 'ought to' or 'should'), or in contrast choice and self-initiation (e.g. 'may' or 'could'). This process effectively facilitated the mapping of themes generated onto SDT constructs. The similarities and differences between themes across the two health behaviour contexts were then compared. Back checking with original transcripts was conducted to ensure that the differences and similarities identified between the two populations were grounded in the data.

Selection of themes for comparison across contexts

As recommended, the primary guide in selecting data to be presented was a clearly defined objective based on the specific study aims (Namey, Guest, Thairu, & Johnson, 2008). The aim of the current study was to gain insight into the motivational responses to legislation of smokers, ex-smokers and people who try to lose weight and to compare these two contexts; as such, only salient similarities and differences that emerged from the two datasets will be presented. This approach was selected over the presentation of all themes, to provide a more focused analysis. The process of identifying these similarities and differences was facilitated by the use of SDT as the two contexts were compared in terms of intrinsic and extrinsic motives for change participants had and the influence of the wider social environment on the type of motivation for behaviour change.

PHASE 1: The Tobacco Control Context

3.2 Phase 1 Methods

3.2.1 Participants and recruitment

Inclusion and exclusion criteria

The study inclusion criteria were:

- aged 24 years or over. This limit was imposed in order to include only participants who had been able to legally smoke in public places, including licensed premises, for at least two years prior to the smoke-free law introduction in July 2007.
- current smokers (smoke cigarettes including hand-rolled every day for at least 5 years so that they experienced the smoke-free legislation) or ex-smokers (stopped smoking completely more than 6 months ago and used to smoke for at least 5 years beforehand)
- English speakers
- living in the UK for more than 6 years (to recruit participants that have experienced England going smoke-free).

Recruitment

As random sampling is not appropriate for qualitative studies (Marshall, 1996), a flexible and pragmatic approach to sampling was used. Recruitment of smokers and ex-smokers took place through a 'smokers' panel' which is a standing panel set up by the UK Centre for Tobacco Control Studies to provide ongoing feedback and opportunities for consultation on smoking-related research. Before the recruitment for this study started, the smokers' panel had met twice. Each meeting had a different theme; members watched three or four presentations from researchers working in the tobacco control area and then were asked to discuss issues surrounding the given topic. Therefore, it was anticipated that members of the smokers' panel would be more likely to provide insight and understanding on the topic that was explored in the current study compared with the general public. The remaining ex-smokers (as smokers panel members are mostly smokers) were recruited among University of Bath staff via the university's noticeboard. All participants were asked to fill in a short demographic questionnaire to ensure that they meet study criteria. Sixteen members of the smokers' panel (14 smokers and two ex-smokers) volunteered to take part in the study of whom seven participants (five smokers and two ex-smokers) were selected for final inclusion by the smokers' panel moderator to facilitate obtaining a wide perspective of views. The remaining participants (two ex-smokers) were recruited from the staff body at the University of Bath. Interviews with participants recruited through the smokers' panel took place in places such as quiet cafes or libraries while with University of Bath students/staff, interviews took place in one of the meeting rooms on the University premises.

Design of the interview

A semi-structured interview containing four sections was developed based on literature review from Chapter 2 to explore policy level factors that might affect motivation to quit (see Appendix 3.1 for full interview schedule). The first section contained general questions on the participant's history of smoking, quit attempts, reasons why people start smoking in general and why they continue to smoke. As during the initial stages of the interview participants often feel anxious about the interview, this stage of the interview aimed to put participants at ease and to establish a positive relationship between participant and researcher (Legard et al., 2003). This initial section also aimed to collect important contextual information (e.g. how long has the person been smoking for, how many times has he/she attempted to quit smoking). The second section of the interview explored further the experience of quitting, reasons why participants thought a particular quit attempt or quit method was successful or not, and also factors that might help them quit smoking. The third part introduced the research topic. Participants were shown a graph illustrating the

reduction in smoking prevalence in England between 1973 and 2006 (ASH, 2008). The inclusion of this graphic material aimed to help participants picture the steady decline in the number of smokers that has been achieved over the past 40 years. Questions in this section of the interview regarded the participants' thoughts on why the number of smokers has significantly dropped. At this stage participants were expected to voluntarily name at least one of the tobacco control policies as the reason for the decline in the number of smokers. If a participant mentioned some policies, he/she was asked further by the interviewer whether he/she was aware of any other governmental initiatives that aim at reducing the number of smokers. At this stage participants were given a lay explanation of the policy and were presented with a list of tobacco control measures that have been introduced in England (Appendix 3.2).

Questions then moved onto participants' views on how these policies might affect motivation to quit smoking or prevent smoking uptake and whether those measures affected the participants' smoking behaviour or attitudes in any way. The final section of the interview focused on tobacco control challenges. The section began with questions on the government's 'right' and need to introduce tobacco control polices, and the influence of those measures on personal freedom. Next, participants were presented with a picture of an example of tobacco plain packaging and were asked about their views on this measure and three other proposed future measures (smoke-free private cars, smoke-free private homes and a ban on tobacco displays in shops). In the interview's closing section participants were asked if they had anything to add to encourage them to express final ideas or opinions (Legard et al., 2003). Participants were also asked whether they would be interested in reading the study report and providing feedback. Participants were told that they would be contacted by email once the data collection finished and the report had been prepared, to check it for accuracy.

3.2.2 Materials and procedure

Participant Information Sheet and Consent Form

The Participant Information Sheet explained the purpose of the study, why individuals were being invited to take part and what the study would involve. It clearly stated that if any question during the interview made the participant feel uncomfortable, then they did not have to answer that question. The Participant Information Sheet also stated that participants were free to withdraw from the study at any time and for any reason. It assured participants that the data they provided would be confidential and anonymised if used in any

publications. Written consent confirming the willingness to participate in the project was obtained from all participants before the interview began.

Ethical issues

The study was approved by the University of Bath Department for Health Ethics Committee. For the recruitment phase, the researcher had to gain access to a 'smokers panel' set up by the UK Centre for Tobacco Control Studies which is open to the public. The person responsible for managing the panel was contacted before the panel meeting and an agreement to attend the panel meeting was sought. The information that the researcher will be recruiting for the study was put on the meeting's agenda so that panel members were aware why the researcher was present during the panel meeting. At the beginning of the meeting, the panel moderator introduced the researcher, explained that she was present to recruit participants emphasizing that taking part in the study was completely voluntary and that expressing an interest in the study did not oblige participants to take part. It was not expected that the research would have any personal benefits for participants, however participants might have found taking part in the study interesting. There was no deception involved and participants were explicitly told what the study aimed to explore and what it would involve. After the interviews were conducted, digital voice recordings were downloaded onto a password protected computer for storage, after which files stored on voice recorders were deleted. Names of participants were not recorded. All hard copies of data containing participant identification were stored in a locked storage cabinet on university premises.

Procedure

Interviews were held between 31st May and 17th June 2011. All participants, having read and signed a consent form, were interviewed and digitally recorded. Additionally, smokers were asked to fill in the Karl Fagerstrom Nicotine Tolerance Questionnaire (Fagerström, 1978) to assess the level of nicotine dependence. Interviews were digitally recorded. Interviews lasted between 25 and 70 minutes. Participants were offered a £15 voucher for taking part in this study. Data was transcribed by the principal investigator (DJ) and a student who was paid for transcription. DJ transcribed five interviews, while four interviews were transcribed by the student and then checked by DJ.

3.3 Phase 1 Results

3.3.1 Participants

Nine participants took part in this study (five smokers and four ex-smokers). There were three males and six females. Participants were aged between 27 and 64 years and they were all White British. Full demographic characteristics of participants are presented in Appendix 3.4.

3.3.2 Emerging themes

Three themes and ten subthemes were identified and they are presented in Appendix .3.5 The three themes are: response to the smokefree legislation, response to the tobacco control policies and smoking and identity. However, only 3 sub-themes will be discussed in more detail as they are relevant to the overarching research question: Normalisation of Smoke-Free Environments, Motivational Responses and Attitudinal Conflict (for full list of themes and subthemes please see Appendix 3.5).

Normalisation of smoke-free environments

Participants expressed a view that smoking is no longer an integral part of everyday life and it has been removed from their day to day interactions. Non-smoking has now become a norm, to which smokers and ex-smokers quickly adapted. Participants found it difficult to imagine going back to a time when smoking was allowed in public places as now it seems 'abnormal':

> P9 (ex-smoker): I find it strange now when I go to places and smell cigarette smoke. Like if you walk past someone on the street that's actually smoking and you smell it, it's so… it used to be just all the time, and now it's really quite odd when you come across that.

This perception that smoke-free environments are now the norm was mostly attributed to the smoke-free law, and smokers recognised that the legislation reduces reasons to smoke and sends a message that smoking is not acceptable:

> P4 (current smoker): it's less socially acceptable now… so people are gonna be less inclined, you know it's now awkward to smoke… before it might not have been, either it was the norm or it was very easy for people to smoke. Now you're excluded more if you're a smoker… quite understandably… there's no reason really to smoke,

there's a lot of reasons why you shouldn't smoke, whilst before it was more, a lot easier to smoke.

However, Participant 1 observed that this process of smoking 'de-normalisation' is not only a result of the implementation of laws and regulations, but also a result of the cultural reception given to smoking and its diminishing social tolerance:

P1 (current smoker): there is the peer pressure thing, there is the fact that it is not seen as a good thing anymore whereas previously, you know, 10 years ago… it was everywhere. It was in the movies, in TV, in you know. It wasn't the taboo subject, whereas nowadays the media pressure, there is more of a taboo subject. And that's why, that obviously played the part (*in reducing the number of smokers*).

As a result of the smoke-free legislation smokers also had a greater appreciation of the protection of non-smokers from passive smoking:

P2 (current smoker): I think it *(the smoke-free law)* is a good thing because banning it from indoor spaces, cause of the issues with inhaling other's people smoke, forcing people to actually smoke your smoke, it's you know, you need to remove that problem. So in that case I think it's a good thing.

However, while smokers understood why they are required to go outside to be able to smoke (i.e. to protect non-smokers from second-hand smoke), a possible reason why they supported the ban was direct personal benefits obtained from the legislation:

P1 (current smoker): you know when you go into a restaurant you can smell the food… it's just generally nicer and cleaner atmosphere…

Quotes from smokers might also suggest that the effects of the smoke-free law are very context specific and smokers might not be concerned with the need to protect non-smokers when they are in an environment where smoking is allowed:

P5 (current smoker): for children as well, it's not good for them to be in a restaurant with smoky atmosphere, because it's, in recent years it has been proved that passive smoking can actually cause a lot of damage…and I think it's been introduced in Europe as well in Spain and stuff I think. Um… but having said that I was um on holiday, went to the Maldives in May, and they don't have a smoking ban there... it was just really weird to sit in a bar and be able to have a cigarette and actually I really quite liked it (laughs).

Motivational responses

Smokers felt that the smoke-free legislation had the biggest impact on their smoking behaviour:

> P1 (current smoker): the ban on smoking in public places, so for example that obviously had… that did have an impact, have a big impact. I think a lot of people did give up or may set to give up.
>
> P4 (current smoker): I mean the smoking, the smoking ban is probably the, the one that affects you the most.

The majority of smokers reported decreased tobacco consumption when they were out socialising. The main reason for smoking less was inconvenience of going outside:

> P5 (current smoker): You end up probably smoking less. Because you physically have to go and brave the wet weather or the or the cold (laughs) and it's actually, you, if you, if I was smoking at my desk I'd smoke a lot, lot more.

However, while smokers adjusted their smoking behaviour to comply with the smoke-free law, they did not feel it affected their motivation to quit. Other measures such as high price of tobacco products were also perceived as not sufficiently motivating to quit. Smokers felt that an 'element' that would motivate them to quit smoking was missing from tobacco control; however, they were not able to specify what it was. They felt that their lack of motivation was not something they could personally influence:

> P1 (current smoker): the other thing is trying to find, trying to help me for example, find why I can't give up. Why I can't make the connection between knowing too well that's it's a bad, disgusting, expensive, smelly, horrible, dangerous thing. Why can't I just flip that switch and stop smoking? And finding that trigger or that switch… Maybe that's a psychological thing? Maybe that's psychological research that can find that trigger, maybe it's biological, maybe it's mental, whatever, I don't know. But there is certainly something lacking in the area and nothing has reached me yet…
>
> P3 (current smoker): I know that one of the next strategies the government is introducing is plain packaging and cigarettes not to be advertis… not to be on display… Again, personally I don't think they are effective. For me they are prompts, they are cues, but they aren't sufficient motivation.

However, smokers felt that tobacco control measures that are currently in place are not motivating and are perceived as controlling:

P2 (current smoker): I think it's more, at the moment, it's more trying to tell people what to do... I think it's more orders than it is policy.

Smokers felt that current tobacco control focuses on protecting non-smokers and making smoking as difficult and expensive as possible for those who smoke and is not offering smokers any alternatives:

P2 (current smoker): I think they *(policymakers)* need to look at their policies very, very carefully and make sure that they're not just trying to keep people as outcasts you know, and to say that with the actual smoking ban in buildings etcetera… That's great for all those non-smokers, it's wonderful because the smokers feel better about that fact that they're not inflicting everything upon their work colleagues, but where are they supposed to go? You know it's that whole thing of, that's fine kicking me out of here but where do you want me to go?

Smokers felt that the government should encourage them to quit or help them quit. Smokers felt the introduction by the government of incentives to encourage smokers to quit would show that the government cares about the needs of smokers:

P3 (current smoker): you must stop, you must stop and the negative aspects of smoking… It's carrot and stick, you can't just beat them with the message this is bad, this is bad, there has to be an incentive as well I believe. I know for example, I believe in Scotland people are encouraged to stop smoking and they give them a 15 pound voucher or something for food in Asda, I think that's the scheme.

However, those who had successfully quit smoking held a different viewpoint, and felt that the motivation should be internal, and offering incentives is unlikely to work:

P6 (ex-smoker): No one gave them an incentive to start smoking, so why should we give them an incentive to stop smoking other than for their own well-being?... I don't need the promise of a two week holiday in the Caribbean…. I tried just basically on peer power and family power saying: 'look, it's not good for you', whether it was my wife or the rest of my family and I thought yes, I'll give it a try, it seemed to last for a couple of days… But once you make that decision yourself, rather than peer power, family power or any other reasons. Once you've made that decision to stop, you have the determination to do it.

P8 (ex-smoker): most of my friends probably stopped because either they're gonna have families so it's been for their own personal reason, rather than maybe anything

the government's supporting. It's because they want to be healthier and they don't want to be smoking when they have children.

Although smokers did not perceive current tobacco control policies as motivating them to quit smoking, some smokers appreciated the environmental measures as they helped them to smoke less:

P1 (current smoker): I find it *(the smokefree legislation)* frustrating at times, don't get me wrong, but I can… it doesn't take 2 minutes to walk outside or find a place, you know an open air… and it does, it has allowed me, as it has done with many people I think, to cut down on the amount they smoke… which could only be a good thing obviously.

Ex-smokers felt that tobacco control measures that change the environment have improved their ability to accomplish the goal of quitting or to smoke less. Participant 9 talked about how the ban on tobacco in vending machines helped her not to smoke during a night out:

P9 (ex-smoker): when they took the vending machines out of the pub, that was often I'd get to the pub thinking 'I will not smoke', then have a few drinks, think 'I really want one now!' and then put 5 pounds in vending machine and get some. Once that option was gone, it does stop you doing that.

Later on she described how the smoke-free legislation helped her not to relapse:

P9 (ex-smoker): it helped me stay stopped, if that makes sense. Because if I was then out with my friends sat around, then if they wanted a cigarette then they'd have to go outside, and I wouldn't go with them, so I wouldn't see it. And then they'd all come back in, stinking, and I'd be like 'oh I used to smell like that, you're disgusting'. But if they'd all just sat around in front of me, it would have been much harder to sit and watch them smoke

Attitudinal conflict

Often in the interviews smokers seemed to distance themselves from other smokers; they did not identify themselves with other smokers and sometimes gave the impression that they felt they were superior to other smokers. In these cases, participants were blaming external, uncontrollable factors for their addiction. For example, Participant 7 said that someone 'must be mad' to start smoking these days:

P7 (ex-smoker): I think people have just become much more health conscious, and then you've got the media and stuff and you keep hearing all these awful health

> stories, you know, sort of, it does… My daughters' generation, she's 18, they must, you know, have this feeling that you'd be mad to start smoking really.

Yet later P7 admits that her daughter actually smokes, and contradicts her own previous statement by inferring that her daughter is not 'mad', as she believes other young smokers to be, but has a more sympathetic view that her daughter started smoking because she was with the wrong crowd. As a result of perceiving oneself (or one's friends and family) to be different from an average smoker, smokers felt current tobacco control measures might not be helping them as these strategies did not take into account their unique and individual characteristics. For example, Participant 2 felt the NHS stop smoking service was very good, but that this service was not able to address the unique issues she had:

> P2 (current smoker): For some people it's pure habit, I think some people have more of an issue with the physical side of giving up. But if you're determined enough you can do it... And I think with some people… they're not really committed to giving up in a first place... You can come up with any excuse for not giving up (laughs). But for me (*after quitting smoking*) my personality was completely different and my ability to do my job was just reduced so drastically. Even after a year, the whole creative side, my emotional state, the mental health issues… Until, until I can find a reason why my whole persona, my mental abilities, my mental scope ummm changes so dramatically, unless I can counter that, I will keep smoking. Unless there is something that will counter those effects as opposed to just the physical ones.

While smokers felt that existing tobacco control measures would not help them quit smoking, each participant was able to propose an alternative measure that s/he thought would be appropriate for them. However, considered in the context of the remainder of their interviews, the alternative strategies that they suggested appeared to be unrealistic. For example, Participant 5 said that the main motivation for her to quit is her daughter and that she would quit 'one day' for her. However, her daughter is already 10 years old and she continues to smoke. Another example of an unrealistic strategy was proposed by Participant 3 who said that the carbon monoxide test might help him quit smoking, even though he has undertaken the carbon monoxide test in the past and continues to smoke. Smokers appeared equally unrealistic about strategies that might work for other people. The majority of participants expressed the view that prevention of smoking uptake is the key and this is where the governmental action should focus. However, this approach did not work for them. Participants all acknowledged being aware of the danger of smoking before they started, but it did not prevent them from taking it up:

P1 (current smoker): I've always known (*it is bad for my health*), that's the thing. I mean… I've always known that… I mean it's all over the place. It's engrained into the popular thinking now that it's bad for you… but who cares?

P9 (ex-smoker): I think I always knew the dangers of passive smoking. When I was a kid, my dad would smoke, me and my sister would say (imitates cough) 'we're dying from passive smoking, dad!' (laughs) you know, to wind him up, so I think I, we were educated in the dangers of passive smoking. But then it didn't actually stop me starting smoking, if that makes sense. I think sometimes the education and the act can be quite removed in your mind, if that's what you wanna do.

PHASE 2: Obesity prevention context

3.4 Phase 2 Methods

3.4.1 Participants and recruitment

To ensure a range of views from people who have experience of trying to lose or control their weight in the current obesity climate, two different groups of participants were recruited:

- 10 participants within the healthy weight category (BMI between 20 and 25) who have either lost weight and successfully maintained the lost weight for a minimum of 2 years or people who are within the healthy weight category (BMI between 20 and 25), but find it difficult to maintain weight and are actively trying to control their weight.
- 10 self-identified overweight individuals (BMI between 25 and 30) who find it difficult to maintain a stable weight and are actively trying to control their weight.

Participants were recruited via: community settings (posters were placed in four community centres in Bath, two fitness centres in Bath, two community centres in west London, one library in Bath, one library in west London); online via the university noticeboard, Gumtree (an online network of classified ads which is free to use) and Facebook; through direct email communication- personal contacts from University College London were used and a list of participants who took part in a weight loss study and who indicated they were happy to be contacted about future studies was obtained (18 contacts in total). Participants who took part in a previous study about motivation and weight loss organised by the University of Bath and who were willing to take part in future studies were contacted (19 in total). All participants who volunteered to take part in this study were asked to fill in an online screening questionnaire to ensure they met the study criteria and to enable the researcher to select a diverse sample. For the list of questions included in the screening questionnaire see Appendix 3.3. As the Phase 2 of this study built on Phase 1 and aimed to address some of the limitations of Phase 1 study, the sample recruited for the current phase was larger. This facilitated greater diversity in terms of weight control experiences (i.e. people of different BMIs including those successful and not successful at weight control), and in terms of key demographic characteristics such as education, geographical location. Data collection continued until data saturation (i.e. no new codes were generated).

3.4.2 Materials and procedure

Participants in Phase 1 who were members of the smokers panel had experience of considering what sort of policies may influence them as smokers, and relative to smokers who were not part of the panel, this generated a wider discussion as they had better knowledge regarding tobacco control policies gained through participation in the panel. Therefore to match the model used in Phase 1, Phase 2 participants were asked to attend a discussion group before taking part in an individual interview, with the aim of the discussion to present the complex causes and a range of possible obesity solutions. It was hoped that through participation in the discussion participants will associate obesity policy with a range of measures such as tax on unhealthy food, and not only with obesity treatment approaches which was the case in the study by Greener et al. (2010). In terms of a research question, similar Phase 1, this phase aimed to explore how the current obesity climate affects individuals' motivation for weight control.

Interview procedure

Before attending the individual interview, participants were invited to take part in a discussion group which involved an education component through a PowerPoint presentation and a discussion to frame the project. The presentation was aimed to be presented in a neutral way (e.g. give statistics about obesity prevalence rather than refer to it as an obesity epidemic). Participants were not asked any specific questions regarding the presentation, but were asked to express their views if they found any of the information interesting, difficult to believe etc. The discussion group was set to last approximately one hour (20 minutes for the presentation and 40 minutes for participants to express their views). The discussion group was followed by individual interviews with each participant. A table that presents the elements of the design and what was meant to be achieved by introducing different topics and materials during the discussion group is presented in Appendix 3.6.

A semi-structured interview containing six sections was used (see Appendix 3.7 for full interview schedule). The first section was a warm up section and contained questions about the reasons for people to gain weight and difficulties they may face when trying to lose weight. The second section explored participants' experience of controlling their weight such as previous diet attempts and the reasons why those attempts were successful or not and what participants thought would help them to control their weight. This was followed by questions that aimed to explore environmental influences on lifestyle choices. At this stage participants were asked whether they noticed any influences on their weight, eating or physical activity habits that were discussed during the discussion group/online video

presentation. Different types and sources of pressure such as other people, media or marketing of the food products were discussed. Questions then moved to explore participants' views about themselves and their weight (e.g. whether they are aware they are overweight; how they think their weight affects the people around them).

Next, participants were presented with three press articles (see Appendix 3.8) about: health risk of being overweight (BBC news *Being overweight linked to dementia*); financial consequences of obesity (BBC news *Obesity could bankrupt the NHS*) and about the increasing prevalence of obesity in the UK (The Guardian *UK women top of obesity league, and men are second- EU survey*). Participants were asked to briefly look at these articles and express their thoughts when reading them. Participants were asked how these articles made them feel and whether they thought the information they have just read could apply to them. The next questions moved onto participants' views on the right of the government to introduce obesity measures. Participants were asked about the role of the government in preventing and treating obesity and what role it should take. This section of the interview also contained questions about GPs' role in treating obesity.

The next section which explored attitudes towards obesity policy began with questions about the effects of these policies on people's behaviour, attitudes and motivation to behaviour change. At this stage, participants were presented with a list of seven policy strands (see Appendix 3.9) and were asked to discuss them one by one. Participants were asked which of the measures in their view could help them control their weight better and the reasons why they thought so. Finally, in the closing section participants were asked if they had anything to add or if they had any questions that they would like to ask. Participants were thanked for taking part in the study and received a shopping voucher for 20 pounds. Travel expenses up to 10 pounds were also reimbursed.

3.5 Phase 2 Results

3.5.1 Participants

Seventeen participants took part in this study. There were nine females and eight males aged between 27 and 60 years old. Mean BMI was 29.01 and it ranged between 20 and 35; three participants were classified as a healthy weight according to their BMI, six as overweight and eight as obese. Full demographic characteristics are presented in Appendix 3.12.

The recruitment of two different groups of participants (healthy weight and overweight) was not successful. The majority of participants who volunteered to take part in the study were obese (BMI over 30), and of the healthy weight participants who volunteered, the majority did not qualify as they either had lost weight recently (within the last year) or had a very low BMI (>18) and used weight control methods associated with eating disorders (Eating Disorders Vicotria, 2013). Thus, it was decided to broaden the inclusion criteria and recruit participants who had a BMI between 20 and 35 and who find it difficult to maintain weight and are actively trying to control their weight. A BMI of 35 was set as a cut-off point as evidence suggests that severe obesity (BMI> 35) is associated with higher risk of psychiatric comorbidities such as clinically diagnosed depression (Onyike, Crum, Lee, Lyketsos, & Eaton, 2003) or night eating syndrome (Gluck, Geliebter, & Satov, 2001). Implementation of the full research design was not successful and seven participants did not take part in the discussion group, but instead watched a pre-recorded online presentation.

3.5.2 Emerging themes

Four themes and 15 sub-themes were identified and the four themes were: reasons and motives for weight loss, experience of obesity preventive policies, perception of what is normal and opportunities to weight loss (full list of themes and subthemes can be seen in Appendix 3.13). As this study focuses on comparing and contrasting the perspectives of smokers/ ex-smokers and individuals who find it difficult to control their weight to consider the wider implications on possible future obesity policies, themes rather than sub-themes will be discussed, as it will provide a fuller picture of how participants experience the current obesity climate and how it affects individuals' motivation for weight control.

Reasons and motives for weight loss

All participants were aware of the importance of a healthy weight, healthy eating and engaging in regular exercise for good health; however, the most common reason participants stated for wanting to lose weight was to improve their appearance. Participants were unhappy with the way they looked at the moment and hoped that losing weight would improve their confidence:

> P9 (female, BMI 27.5): When I look at my pictures when I was in my twenties and my thirties, I think oh my God I used to be slim there... So yeah, that's what's motivating me.

> P4 (male, BMI 29.5): I wanna lose weight cos I wanna present positively, so that is important, that is quality of life innit if you're confident about the way you look innit.

However, while participants' narratives suggest that better health and improved appearance were the reasons why they would like to lose weight, they felt it was not enough to motivate them to change their eating and/or physical activity habits:

> P3 (male, BMI 34.5): better health reason alone should be enough to motivate me… I haven't my own motivation or been motivated to lose weight um.... part of the reasons I've come to take part in the study is to see if I could find a key that would unlock it for me you know, so bit selfish really…

> P9 (female, 27.5): In my mind frame I do want to lose weight, I do want to, I just haven't got the motivation. Yeah my motivation is very low.

Apart from a lack of motivation, difficulty in changing eating and physical activity habits was also identified as a major barrier towards weight loss. Participants felt that they are 'set in their ways' (i.e. have strong unhealthy habits) and it would be difficult for them to break these habits. The perception of the healthy lifestyle they had appeared to hold, made it even more difficult for participants to envisage this change, as participants felt that adopting a healthy lifestyle would mean changing the majority of their eating and physical activity habits and adopting a lifestyle that was perceived as boring and lacking fun (as for example someone would no longer be able to enjoy sweets). Some participants had an extreme view and felt that people either eat a lot and are overweight or they are bulimic. This might indicate a lack of belief that it is possible to maintain a healthy weight through a healthy diet:

> P8 (female, BMI 35): You can't seriously cut everything out, there is no life, what's the point (laughs). We've got all this variety and all this choice of food…Like oh my God I would have to just cut this out all together, what's the point, why have I done

that? I don't have willpower for that. I could not be bulimic or anorexic. I couldn't put a finger in my throat. I don't want to make myself sick, I don't like doing that, so I couldn't do that.

Previous lack of success in losing weight was also identified by many participants as an important barrier towards weight loss:

P1 (female, BMI 31.5): I joined Slimming World and it was… it was good. I lost weight… but then I've put not only that amount of weight on again but more. So yes, I have tried and I did actually joined Slimming World about six weeks ago ummm and I lost… I did it for three weeks and I really really tried and I did exercise as well, umm not much but I did sort of get on that exercise bike umm… and I lost half a pound a week and I thought: I can't be arsed… Can't be bothered. But half a pound a week, I thought oh my God, that' neither here or there! So I was very disappointed.

Participants felt that this lack of motivation was not something they could personally influence. The power to enhance their motivation lay with doctors, the government or others. One possible motivating factor that participants identified was being told by a health professional about weight status and the health consequences of excessive weight:

P2 (female, BMI 28): *(information from your GP)* I think that's probably the strongest nudge the person can get, because if it is a professional who tells you: you know you should really lose some weight and here is the way you can do it. I think that's probably the best, I mean the most guaranteed I would say.

However, the majority of participants were advised by their GP about their weight status and they felt this approach was not effective for them as they were aware of the negative consequences of their weight. Therefore, they felt that something that would help them to translate their desire to lose weight into action should be offered. Participants proposed a number of initiatives that could be introduced that they felt would motivate them. These initiatives could take different forms, but the majority of those suggested by participants included some aspects of monetary incentives ranging from free exercise sessions to food vouchers:

P3 (male, BMI 34.5): if they came up with a crazy scheme along the lines of… join a gym or um fitness centre or a swimming club err and if you lose weight within 6 months you get your membership paid for or we'll pay for your membership… I think it would motivate a lot of people.

P6 (female, BMI 30): Also like swimming pools they should… be a time in a day when you can go to the swimming pool for free, maybe like a window, like after work

there would be like one hour or two hours where it's free and the rest of the time people pay. It would encourage me.

P10 (female, BMI 33): little incentives, doesn't have to be much. Discount vouchers off expensive products, you know when you buy Philadelphia Light, but it's gonna be a pound cheaper.

Some participants felt the government should pay people to lose weight as this would serve as a very strong incentive. Participant 9 recounts what she thought when she saw an advert of the weight reward programme being piloted by the NHS, whose participants are paid for the lost weight:

P9 (female, BMI 27.5): When I saw this *(advertisement for paid weight loss)* I thought this is an incentive, you know, this is very generous of the health service giving you something to lose weight. I felt like they were helping me. That was my expectation, but obviously it wasn't (*as participants of this programme had to pay a joining fee*).

In summary, the majority of participants talked about extrinsic motivators that they felt they needed for weight control. In contrast, healthy weight participants who also found it difficult to control their weight, but managed to stay within the healthy BMI range, talked about more internal motivators. For example, for Participant 17 being a rowing enthusiast helped him control his weight. Rowing was an important part of who he was, therefore it was important for him to be in good shape and to achieve good results and it motivated him to control his weight.

Experience of obesity preventive policies

Participants were asked to reflect on policies, strategies and services they thought would help them lose weight or control their weight more effectively. The vast majority focused predominantly on policies that provide opportunities, where people choose whether or not to engage, such as obesity management. Many also talked about environmental policies that they felt would improve people's ability to make healthier food choices:

P13 (male, BMI 32): The doctor could say look he as your doctor is concerned about your weight and see if that, cause people would take something from their doctor... and then he should offer the support, cause I know the service exists, the service of Weight Watchers on prescription does exist.

P2 (female, BMI 28): So I thought maybe having you know smaller packaging especially of snacks could perhaps help. A person could still get it, but then wouldn't eat the whole big pack of crisps or sweets or so.

When asked about their use of services and policies that are currently provided such as food labelling, they expressed a view that they did not use them themselves:

P10 (female, BMI 33): Labelling is important. You know the Traffic Light thing is quite good, cause that's… Calories, sugars, salt, ok. I don't really pay much attention to the writing, I might notice the colour system.

I: And what do you think when you see there are like two reds and one orange [on the traffic light system]?

P10 (female, BMI 33): Well, I… it is interesting, isn't? This maybe more me, but I tend to know by and large if it's a packet of sausages *(it has)* fat in it, but if I want a packet of sausages, I'm gonna eat them anyway, so umm… I tend less probably to notice that, unless it was glaringly red, you know, if it had a little bit of… If all three colures were red, I would probably still buy it unfortunately (laughs). Yeah, labelling is important.

Participants had a similar view regarding future possible measures. They believed that these measures could help other overweight people, but they did not view these policies as a possible source of help for themselves. For example, Participant 6 expressed a view that warnings should be introduced on the fast food products as this might deter some people from eating such foods. She was then asked what she would do if she went to a McDonalds (which she previously identified in the interview as one of her favourite fast food outlets) and there was a health warning on the burger wrapping:

P6 (female, BMI 30): Maybe I would still eat it (laughs)… but you know if I have a burger, I would have small, but I would never eat one of these really big ones, you know, the huge big burgers, because when I see them, I think unhealthy and I think heart attack or something like this. But I think if the burger is small like this, I think oh I could just get away with one, you know.

A common theme was the perception that obesity policies were aimed at morbidly obese people. Participants therefore did not perceive many policies, services or information about being overweight as personally relevant as they felt they were 'merely' overweight. For example, participants were presented with BBC news 'Being overweight linked to dementia' and asked if this information could apply to them. The majority of participants expressed a view that this information is not personally relevant, while a minority of participants felt that

it could apply to them, but in a very distant future (and only if they put on more weight) and that it was highly unlikely:

> P1 (female, BMI 31.5): I don't see myself as being that obese (showing pictures from the news headlines).

> P8 (female, BMI 35): I wouldn't look at myself with dementia, that's not me, because you're looking at the pictures and they've got like people that are more than definitely twice the size of me. And I think, well I'm not there. I'm not there yet.

Another possible reason why participants might not take advantage of opportunities that are provided to help them lose weight was the perception of being unique and different from other overweight people. Therefore, participants felt that policies that would help 'others' would not be appropriate for them:

> P10 (female, BMI 33): But I think because I myself I'm 5-6 stone overweight, then it's not so easy to lose, plus there are other mitigating factors with me, like I have a thyroid problem now. A lot of people say I have a thyroid problem, but I do, I have to take tablets for this every day. I am also, the age I'm at, I'm practically postmenopausal… So I think there are lots of factors that affect the weight I am and why I am the weight I am… Whereas I think these women (*from newspaper photo*) look to me like they're sitting and eating doughnuts and not doing a lot. That's a very judgmental thing, but it's just an observation that's... Or you know they have some kind of hormonal problem, but I don't think so, I think this is just overeating and sedentary lifestyles.

The majority of participants were aware of what type of help is available through GP surgery and some were offered these services (such as a referral to Weight Watchers); however, they felt the way doctors offer them did not convey choice and this lack of choice was a barrier to engagement:

> P9 (female, BMI 27.5): (*referral to Weight Watchers*) it's rubbish, I don't like that, because it feels to me, I went to one and all you do is you sit down and you talk about your goal and I came out, I went in fat and I came out fat so (laughs). I want it more hands-on, more productive, more pro-active, that wasn't enough for me. It's nice to meet people, but it's not enough.
>
> P16 (female, BMI 24): if they (*GPs*) could say you know there is support, if you do want to lose weight, there is support out there for you umm go and see your GP about the options. So people would think oh there are loads of options for me to do and I can go and talk to somebody about that, rather than one thing in particular.

Participants had very strong views on what they felt would help them. The majority of them wanted to try things they had already tried in the past such as a particular weight loss diet or things they still wanted to try. For example, Participant 9 successfully lost weight after attending a boot camp. However, she regained the lost weight shortly afterwards and felt that the best way for her to lose weight would be to attend another boot camp:

> I: and what do you think might help you (*to lose weight*)?
>
> P9 (female, BMI 27.5): I told you, I need a boot camp (laughs). Boot camp (laughs) on the government.

Perceptions of what is normal

The majority of participants had an unrealistic perception of the number of overweight and obese people living in the UK. They found the statistics on obesity they were presented with during the presentation difficult to believe:

> P8 (female, BMI 35): I don't really think, you know the figure that you were showing us (*during the discussion group*) last week, I didn't realize there was a lot people that were overweight or sorry obese. For when I walk around genuinely I didn't think most people are.

However, this phenomenon was present only among overweight/ obese participants. In contrast, healthy weight participants felt that the number of overweight people living in the UK had recently increased:

> P15 (female, BMI 20): I mean I'm 31 and I've worked in schools and I've seen groups of teenage girls kind of through. In every year they seem to get bigger, which is quite surprising for me. They are just getting bigger and bigger and bigger.
>
> P17 (male, BMI 24): I'm not very old, I'm 27, but I see a difference in kids for example. Since I was a kid, because when I was a kid I was bullied for being fat and like in pictures of myself I remember being quite fat, but I don't think I would have been bullied for being fat today. I think I would have been normal compared to the kids that I've met.

The reason why Participant 8 might have failed to notice large numbers of overweight and obese people is that she tends to classify people who are overweight as 'normal'. This is expressed in her quote about the plus size models used in advertising:

P8 (female, BMI 35): You're noticing more these sort of girls *(models)* coming on, but they try to tell us that they are kind of chubby. And they are like no, this is my size. And I'm thinking God, you're nothing near a size 14 or 16 either, so they are not even chubby, they are size 12, so is that really the norm? Size 12? Most women are like 14 and above. So it's getting a little bit better. They are getting a little bit better; it doesn't seem so much stick thin models and everything around.

A common theme was a perception that only morbidly obese people constitute the 'real' obesity problem, while people who are overweight are part of the 'norm':

P2 (female, BMI 28): I don't see such a big issue in people being slightly overweight rather than being obese. When somebody is really large, you know, you umm I would see, you know, people around me and some of them are slightly bigger, some of them are slightly smaller, but I would still think that's part of their body kind of. But then when you see really large umm large people I think, you know, there's where the issue is.

This distorted perception of the number of overweight and obese people living in the UK and the perception of who is truly overweight and who is within the norm, might be a result of the increasing prevalence of obesity and the increase in the average weight and size of people. As the threshold for the perception of being overweight has increased, participants might demonstrate decreased sensitivity to recognise other overweight people around them:

P17 (male, BMI 24): I think if you're overweight and people around you are slightly overweight, then it brings you down relative… It's a sort of community thing where everybody gets steadily a bit more fat.

As the average weight of the population increases, and the threshold for classifying someone as overweight decreases, it might in turn affect the recognition of the negative consequences of obesity (e.g. it might reinforce the perception that someone of normal size is not unhealthy). This point is illustrated by Participant's 6 remark on the use of pictures of morbidly obese people by the media:

I: Ok, and if there was a picture of someone size 18 let's say, what would you think?

P6 (female, BMI 30): Not much really, cause I think I'm a 16, so you know an 18, one size up… I wouldn't think ok they are not that unhealthy or bad, you know, but somebody like this *(morbidly obese)* it's very bad.

The ‘bigger norm’ might not only be reinforced by the average size of the local population, but also by the most prevalent behaviours that this population engages in, where eating unhealthy foods and leading a sedentary lifestyle might be perceived as the norm:

> P2 (female, BMI 28): I realised generally that we look around ourselves and we see, you know, what everyone is doing and… what I mean by that is that for example we may think that having takeaways, I don’t know 3 times a week is acceptable, but actually we don’t know that we don’t burn all this energy.

> P17 (male, BMI 24): I’m not particularly healthy, but I’ve worked in places where people considered me as sort of a health fetishist. Like a health freak. Just cause I’ve got a bike or cause I, you know, cause I don’t eat a lot of chocolate or… I think that’s worrying really that not even super health in Britain is sort of a fetish, you know, and people wouldn’t consider you odd for driving where you’re going, but they do consider you odd if you cycle there or walk there.

These perceptions of what constitutes normal behaviour were reinforced by two factors: reaction of friends and family to a given behaviour (also whether it is performed with them) and how easy it is to perform a given behaviour. Eating an unhealthy diet and leading a sedentary lifestyle was perceived as being easy and convenient, while being healthy as requiring special and conscious effort:

> P7 (female, BMI 29.5): So if I wanted to eat healthily, what I would do is buy each of these vegetables and put them together and roast them and I don’t know, come up with the soup or casserole or something, whereas if I wanted to eat unhealthily, it would be much quicker for me to prepare, it feels much more convenient.

> P1 (female, BMI 31.5): it’s a very easy lifestyle to just get into the car and zap around to collect something…

> P5 (male, BMI 27): I’ve tried to eat five pieces of fruit a day and you know I mean at first you feel really self-righteous and feel good about yourself and then two weeks into it you think God this is boring. It is boring, isn’t it? … all the time thinking you know, you can’t live your life that way, I’ve got work to do, I’ve got to study, I’ve got to see my friends and family.

Eating unhealthy food and drinking alcohol was perceived as a key element of interactions with friends and family, socializing in particular:

> P2 (female, BMI 28): *(when you are socialising)* you've got a glass of wine there, you've got a little snack there… it's socialising in this way, it's not going for a walk for example (laughs).

A very important aspect of socializing was camaraderie felt in sharing a treat, or the perception that they were eating 'something they shouldn't', together:

> P8 (female, BMI 35): for me and my friends… if we go to each other's houses, we try to consciously say ok we eat something healthy and with the children as well and ok I'll say I bought these muffins there, but that's a treat. We've done well today, we'll treat ourselves. And we go uh you're a devil, but vice versa it's the same when you go to each other's houses we get a little treat, but we will say look that's the choice, we can have it or we can't have it, we don't have, it's a choice really. But we obviously say oh go on then…

Thus people would support each other in having an unhealthy treat and sharing it together, but in contrast most of the participants talked about how friends and family are not supportive to their achievement of the goal of healthy eating, for example by undermining diet attempts:

> P1 (female, BMI 31.5)**:** When in the past I had actually said no I don't want that, then they say oh, you know, come on, go on. They force it upon you, you know. Or my husband, you know, I say oh I don't want a second glass of wine, oh you know, it won't hurt you, oh you won't put that much on. It's more calories in salads that you eat than in a glass of wine... Umm so I have got that pressure as well, but I think friends do force things on you. And they say oh it won't matter, have it.

> P15 (female, BMI 20): a lot of people I think still find it quite funny perhaps that somebody is trying to lose weight, they kind of tease them about it, they might wave chocolate biscuits in front of their faces umm so that still happens, which is a shame.

3.6 Discussion

The current study explored the views of smokers, ex-smokers and individuals who find it difficult to control their weight, on existing and hypothetical future policies aimed at reducing behavioural risk in each setting. The aim was to compare and contrast the views of each population, to provide insight into the process of translating successful lessons from tobacco control into the obesity domain. The similarities and differences that emerged between these two contexts will first be discussed, and will be followed by a section considering wider implications of the findings on obesity interventions and policies. Figure 3.1 depicts the similarities and differences identified in both contexts, and the connections between the two

Table 3.1 Comparison of similarities and differences identified in both contexts.

	SMOKING CONTEXT	OBESITY CONTEXT
DIFFERENCES	**Social normalisation**	
	➢ non-smoking in public places is the norm	➢ being a healthy weight or eating a healthy diet not perceived as the norm ➢ being healthy perceived as anti-social
	Policy visibility	
	➢ effects of the tobacco control policies in the environment are 'visible' ➢ effects of policies helped smokers to smoke less or helped ex-smokers to quit once they decided to act	➢ individuals less aware of the measures that aim to re-shape the environment ➢ participants not able to battle against the obesogenic environment
SIMILARITIES	**Perceived associations between policy and motivation** ❖ insufficient motivation to enact changes ❖ policies are designed to help smokers or overweight people to change their behaviour ❖ those successful in quitting, perceived tobacco control policies as helpful in achieving the goal of quitting smoking or not relapsing	
	Rationale for behaviour change ❖ health rationale for losing weight or quitting smoking not relevant or meaningful ❖ participants felt that weight loss is difficult and requires a complete change of eating and physical activity habits	
	Predicting what approach would help ❖ high support for the introduction of financial incentives among both groups ❖ participants not good at predicting what approach would help them	
	Strong within group differentiation ❖ felt different from other smokers or overweight people ❖ tobacco control/ obesity policies do not take into account needs of the individual ❖ not willing to try services provided for them to help them quit smoking or control their weight more effectively	

3.6.1 Differences and similarities between smoking and obesity contexts

Differences

Social normalisation

A key difference that emerged between the themes generated in Phase 1 and Phase 2 of the study was the perception of a given behaviour being acceptable and normal. Smokers and ex-smokers believed that smoking has become less socially acceptable and non-smoking in public places is now perceived as the norm. This shift from the smoking to non-smoking norm was mostly attributed to the smoke-free legislation, however some felt that this 'de-normalisation' of smoking was a gradual process and started before the smoke-free law was introduced; nonetheless, the smoke-free law has strengthened this perception. The results from a study conducted by Poland (2000) in Canada suggest that some smoking behaviours were already considered unacceptable before the smoke-free law. Smokers, ex-smokers and non-smokers were interviewed on what it means to be a considerate smoker and which practices signal consideration towards non-smokers five years before the smoke-free legislation was introduced. Although there were significant differences in views between smokers and non-smokers as to which practices were enough to protect non-smokers from passive smoking, there was agreement on which practices constitute a 'considerate' smoker. For example, refraining from smoking in the presence of non-smokers was classified as considerate smoking, while having to walk past smokers to get out of the building was considered non-considerate smoking. However, this study was conducted outside of the UK therefore the results might differ from the UK context as for example other policies that could have affected smokers' attitudes might have been introduced.

In contrast, in the obesity context, being a healthy weight was not perceived as the norm. A shift in perception of what is normal in terms of body size was attributed to social weight comparisons (judging the appropriateness of body size on the average population weight rather than using objective criteria). This finding is in line with previous research that has reported changing perceptions of the weight norm, both in quantitative and qualitative studies (Burke, Heiland, & Nadler, 2009; Johnson-Taylor, Fisher, Hubbard, Starke-Reed, & Eggers, 2008; Johnson, Cooke, Croker, & Wardle, 2008; Schmied, Duff, Dahlen, Mills, & Kolt, 2011). For example, Johnson et al. (2008) examined changes in the public's perception of being overweight in the UK between 1999 and 2007 and demonstrated that in 2007 significantly fewer adults identified themselves as overweight. Similarly, in an evaluation of an Australian *Measure up* campaign, around 50% of those who were classified according to their BMI as overweight felt their weight was acceptable (The Social Research

Centre, 2010). Similar results were obtained in a study conducted in the United States that used data from two waves of the National Health and Nutrition Examination Survey [NHANES III (1988–1994) and NHANES (1999–2004)]. In the later survey fewer overweight adults recognised themselves as overweight (Johnson-Taylor et al., 2008). What is more, in the US, not only has an increased acceptance of an increased 'norm' been reported, but also an increase in the desired body weight. During a nine year period (between 1994 and 2003), the desired body weight increased by 2.3kg (5lb) (Maynard, Serdula, Galuska, Gillespie, & Mokdad, 2006).

One of the possible influences on what is perceived 'normal' in terms of body size was, according to participants, the way media portrays obesity. Media messages regarding overweight and obesity are often accompanied by pictures of adults who are morbidly obese (Heuer, McClure, & Puhl, 2011; McClure, Puhl, & Heuer, 2011), which might strengthen the stereotype of an overweight person being morbidly obese and convey the message that being overweight is normal and acceptable. The majority of overweight and obese participants in the current study felt that an article describing the risks associated with being overweight was not personally relevant, as they did not resemble the pictured individual in terms of the amount of excess weight. No studies could be identified that had systematically investigated whether the size of the model in photographs accompanying health information does affect message perception and acceptance in a wider sample, so this finding might be worth exploring in future studies**.**

Participants' comments also indicate that not only has a shift in perception of what is normal in terms of size occurred, but also in terms of eating and physical activity behaviours. Participants felt that healthy eating or attempting a weight loss diet was perceived as anti-social. Their close networks (family, friends) were not supportive, and were even undermining the participants' attempts to eat healthily. This perception was particularly prominent during social occasions where eating large quantities of unhealthy food and the feeling of camaraderie in sharing these foods was particularly important. Such findings have been observed in other recent qualitative studies (Whale et al., 2013; The Social Research Centre, 2010, Hammarström**,** Wiklund**,** Lindahl**,** Larsson, & Ahlgren, 2013). For example, Whale et al. (2013) in a study exploring support and societal pressure towards weight loss among clients of a commercial weight loss programme, concluded that while women felt pressure to be thin and to lose weight, at the same time they were faced with negative reactions from friends and family when attempting to lose weight. They were trying to conform to a thin standard, but at the same time being on a diet was in conflict with enjoying unhealthy food during social occasions. In a qualitative study of Australian adults conducted

as part of the *Measure up* campaign, socialising was seen as a big barrier to healthy eating and having a healthy option was perceived as anti-social (The Social Research Centre, 2010). Therefore, while previous qualitative studies identified lack of social support as an important barrier to weight loss, this study indicates that unhealthy eating is becoming normalised, while eating healthily might be perceived as 'not-normal' and not only during social gatherings.

This perception of what is normal may affect individuals' subsequent behaviour (Burke et al., 2009; Dedobbeleer, Béland, Contandriopoulos, & Adrian, 2004; Johnson et al., 2008; Johnson-Taylor et al., 2008; Poland et al., 2006; Schmied et al., 2011). In both studies participants were adjusting their behaviour to comply with the norm. Smokers were refraining from smoking in public places even if they were not motivated to quit, while participants of the Phase 2 study were for example eating a cake during social occasions even though they were on a weight loss diet. This compliance with the wider social norm is consistent with theoretical predictions that people are sensitive to social expectations and pressures (i.e. social norms) (Rende, Slomkowski, Lloyd-Richardson, Niaura, 2005, Smith & Christakis, 2008). SDT might help to explain why people would comply with the wider social norm as according to SDT the social context might facilitate or hinder satisfaction of basic psychological needs, which in turn would affect quality of motivation (Deci & Ryan, 2014). Therefore individuals who are exposed to an environment that promotes unhealthy food (distal context) and are pressured by friends and family to eat unhealthy foods (interpersonal context), might develop a more controlled motivation and as a result be more likely to comply with the social norm as they are concerned with presenting positively (Lewis & Neighbors, 2005). It has been shown that students tend to overestimate how much other students drink and that the number of drinks per week can be reduced by correcting these norms by offering normative feedback (Neighbors et al., 2006). At 2 month follow up, students who received personalised feedback reported drinking significantly fewer drinks per week compared with the control group. Among participants who were more externally regulated in their drinking motivation and who might be more sensitive to social pressures (as the extent to which indivudals are sensitive to such expectations is developed over time as a result of an interaction with the social context), normative feedback had a higher impact on alcohol related problems such as driving under the influence of alcohol. Controlled motivation was found to moderate the relationship between the effect of feedback and changes in alcohol-related consequences. This demonstrates that exposure to such controlled environments where individuals are pressured to engage in certain behaviours (e.g. having a dessert), might result in the development of a more controlled motivational orientation.

In contrast, in the context of smoking, although smokers felt that the requirement to smoke outside public buildings was inconvenient, they did not perceive it as a form of control as they accepted the rationale as reasonable on the basis of reducing the impact on others. As a result, they had a tolerant, and often very positive, attitude towards the ban. This suggests that the smoke-free legislation was introduced in a way that promoted autonomy orientation and smokers regulate their behaviour based on their internal values. A possible reason for that was that although smokers had no choice about this law, they were provided with a meaningful rationale for the lack of choice (i.e. the need to protect non-smokers from passive smoking). The locus of control shifted from external (i.e. prohibited by law to smoke in public places) to internal (internalised value of the regulation). Similar results were observed in a longitudinal qualitative study by Ritchie et al. (2010b) in which data pre- and post- smoke-free legislation were collected in Scotland between October 2005 and March 2007. Smokers rationalised change in their behaviour and felt that once the smoke-free legislation was in place they became more considerate smokers who had respect for the non-smokers' right to clean air and also for bar owners and managers who would bear the consequences of prosecution in case of a breach of this law. This might suggest that this policy (smoke-free legislation) was introduced in such a way that smokers accepted the regulatory process as their own. These findings demonstrate that policies that promote autonomy orientation might be more successful in promoting sustained and self-endorsed behaviour changes rather than engaging in a behaviour due to perceived pressure from one's environment.

Policy visibility

Participants in both studies discussed their impressions of the environment, and whether they thought it influenced their motivation and behaviour. A big difference between the tobacco and obesity contexts was the extent to which policies re-shape the environment and the extent to which policies or the effects of these policies in the environment are 'visible'. Smokers and ex-smokers named two or more measures that aim to re-shape the environment to be more supportive for people not to smoke, such as the removal of tobacco vending machines or a ban on display of tobacco products in shops so that such products are no longer visible. Smokers felt that the policies that they were aware of have made smoking difficult, and although these measures have not altered their motivation to quit, they helped them to smoke less or helped them to quit once they decided to act. Conversely, individuals trying to lose weight predominantly discussed treatment approaches, or measures that might help individuals eat a healthier diet such as food labelling, and appeared to be less aware of the measures that aim to re-shape the environment. Overall,

they felt that little support from the government for those wishing to lose weight is provided which might suggest that there is a difference between tobacco and obesity domains in terms of policy visibility.

Due to the lack of visible policies related to obesity, participants felt they were not able to battle against the obesogenic environment and to some extent felt their unhealthy behaviours were normal and justified (e.g. buying biscuits because they were on offer). This might suggest that individuals 'delegate' some responsibility for their motivation and behaviour onto the environment. There is some support for this notion from the literature on tobacco control. It has been demonstrated that advertising of tobacco products and display of tobacco in shops normalizes tobacco products in the eyes of the public (Henriksen et al., 2002; Lovato et al., 2003). This is also in line with previous studies which suggest that although overweight and obese individuals most commonly attribute their excess weight to personal failing (Heuer et al., 2011; Puhl & Heuer, 2010), they feel they would not be able to address their weight and long term support (mostly from health professionals) is needed for successful weight loss (Greener et al., 2001). Therefore making obesity-based policies more 'visible' may help people to perceive their environment differently, and to be more supportive; it would be interesting to explore the impact that this would have on people's attributions of responsibility for associated behaviour change, and their personal motivation.

Similarities

Strong within group differentiation

Participants in both studies demonstrated a strong within group differentiation. Smokers felt unique compared with other smokers, while overweight and obese participants, although being aware of their weight status, felt unique compared with an 'average' overweight person (e.g. faced different problems when attempting to lose weight). These positive illusions have been previously described in the literature and termed 'illusory superiority' (Hoorens & Harris, 1998), also known as 'better than average effect' (Guenther & Alicke, 2010) or a 'misguided exceptionalism' (Koehler & Poon, 2006) a phenomenon where people perceive themselves as special and feel that a special set of psychological rules apply to them. Koehler and Poon (2006) argued that this phenomenon arises from people's inaccuracy in self-prediction, which often undermines the value of situational influences and overestimates the influence of personal characteristics. These illusions may be a consequence of optimistic bias (also known as unrealistic optimism), which is a tendency to overestimate the likelihood of positive events and to underestimate the likelihood of negative events (Weinstein, 1998). Studies of optimistic bias among smokers have shown that while smokers acknowledge that their risk is higher compared with non-smokers, they tend to minimize the risk and they rate the risk of becoming addicted to nicotine or suffering ill effects from smoking lower compared to other smokers (Weinstein, 1998). This tendency to underestimate one's personal probability of encountering negative events has been documented in other behaviours such as cancer risk perception (Kevin & Smith, 1995), experiencing problems due to alcohol consumption (Dillard, Midboe, & Klein, 2009), car accident risk (DeJoy, 1989), and risks associated with having a high fat diet (Frewer, Shepherd, & Sparks, 1994). People exhibit more unrealistic optimism about problems they believe they can control (Harris & Middleton, 1994; Miles & Scaife, 2003), but it is unrelated to the level of knowledge about the problem (Welkenhuysen, Evers-Kiebooms, Decruyenaere, & Van Den Berghe, 1996).

As a result of feeling unique, participants in both studies were not willing to try services provided for them to help them quit smoking or control their weight more effectively, as they felt these services were provided for an 'average' person and were not personally relevant. Similar results were observed in recent qualitative studies. For example, in a study exploring consumers' acceptance of policy interventions aiming to promote healthy food choices such as food labelling or accessibility of low calorie products among Dutch adults, participants felt that such measures would not be personally helpful, but might be effective for society as a whole. The main perceived reasons why these interventions would not be effective for

participants personally was perceived high nutritional knowledge (Bos, Van der Lans, Van Rijnsoever, & Van Trijp, 2013). This perception of being unique might be a barrier to engagement with opportunities provided for smokers and individuals who find it difficult to control their weight. This might explain why although 21% of the English adult population are smokers (ASH, 2013) and the majority of these smokers (70%) feel they are motivated to quit (West & Brown, 2012), each year only 4% access the NHS Stop Smoking Services to assist them in quitting smoking (West & Brown, 2012), as smokers perceive that this approach will not be effective for them. The plausibility of the hypothesis that people's perceptions of being unique might be a barrier to engagement with the services provided both for smokers and individuals who find it difficult to control their weight has yet to be evaluated, and would be a useful direction for future research.

Research evidence suggests that these self-predictions participants appeared to hold that a given strategy might not be personally helpful, might not be accurate. This was demonstrated in a study by Koehler et al. (2011) where participants were offered a service that would help them to stay within their monthly budget using constant monitoring of their spending and some tips on saving. Participants felt that for themselves the service would not be beneficial, while it might be good for other people and would help them save money. However, their self-predictions were inaccurate as in another sample of participants who were randomly assigned to the service, those using the service were 11 per cent more likely to meet their budget goals. These findings taken together question the notion of investigating public policy support to inform policy-making as individuals might be likely to support approaches (as they would think they would be effective for other people), but they would not need them if implemented in the future.

Perceived associations between policy and motivation

A key similarity between the two contexts was a perception that neither tobacco control nor obesity policies are designed to help smokers or overweight people to change their behaviour. This was especially prominent among smokers who felt that tobacco control policies are designed by people who are not themselves smokers and that current tobacco control policies focus on protecting non-smokers and making smoking difficult and expensive for those who smoke. They also indicated that policymakers are not taking into account the needs and rights of smokers. For example, while smokers had generally a very positive attitude towards the smoke-free legislation, they indicated that facilities for smoking outdoors such as canopies were not provided. Similarly, participants who find it difficult to control their weight felt that obesity management approaches are introduced in such a way

that does acknowledge the individual perspective of overweight people. For example, an overweight or obese person who consults his/her GP about weight loss advice, might be referred to a dietician or a Weight Watchers group, and this approach according to participants of Phase 2 does not offer opportunities for choice. These findings might suggest that policies were generally perceived to be controlling and not useful to support their own behaviour change attempts.

In contrast, former smokers who were successful in quitting, perceived tobacco control policies as helpful in achieving the goal of quitting smoking or not relapsing. For example, a smoker who was trying to quit smoking found the ban on tobacco vending machines in pubs useful as then she would not purchase cigarettes during a night out (if they had been in place she would buy them on impulse). These differing views between smokers and individuals who find it difficult to control their weight and ex-smokers might be explained from the SDT perspectives. According to SDT, people's behaviours are situated within the social environment and factors in the social context will exert influences on people's motivation (diminish or enhance autonomous motivation). The societal and environmental factors operate at three different yet interactive levels (situational, contextual and global) (Vallerand, 2000; Vallerand & Ratelle, 2002). At the most distal level there is the wider social environment that includes policy environment. For smokers and individuals who find it difficult to control their weight it appears that this context is not supportive of basic psychological needs and such a controlling environment is predicted to undermine autonomous motivation where people lose their own sense of value and do not self-regulate— and such communication is not promoting change (Moller et al., 2006). Therefore they do not perceive policies as autonomy supportive (and do not take advantage of them) as their motivation for behaviour change is relatively controlled. There is some evidence from studies on cigarette warnings to support this claim that those who are motivated might perceive policies as more useful and helpful. In a study of 3937 Dutch adult smokers exploring the impact of new health warnings on cigarette packs on smokers' motivation to quit, among those who already had an intention to quit, new health warnings caused a perception of cigarettes being less attractive and increased their motivation to quit. In contrast, among those who were unmotivated to quit, the new warnings had a counterproductive effect and caused reactance (Willemsen, 2005). In another study of the new cigarette warnings, those who had an intention to quit were more likely to cognitively engage with the label (i.e. read the label, think about it and discuss it). At follow up, those motivated to quit were more likely to make a quit attempt, quit smoking or reduce cigarette consumption at follow up compared with those who were unmotivated (Hammond, Fong, McDonald, Cameron, & Brown, 2003). These findings taken together might suggest that

being motivated for behaviour change might be a pre-requisite for engagement with health policies rather than such approaches being able to motivate individuals to take action. However, it is also possible that policies introduced in a more autonomy supportive way would encourage people to be guided by their own values and this would prompt change.

Rationale for behaviour change

Participants interviewed from both health contexts found it difficult to understand why although they were aware of the negative consequences of excess weight or smoking, they did not feel the health rationale for losing weight or quitting smoking was relevant or meaningful. According to SDT, there are two types of processes through which individuals can internalize the regulation of uninteresting although important activities - introjection and integration (for more details see Chapter 2, section 2.6.2). Different contextual events are important for integrated internalisation and one of them is having a meaningful rationale that would help the person understand why self-regulation would have a personal utility (Deci et al., 1994). This might therefore suggest that the value of health and healthy lifestyle has not been internalised, such that self-regulation would remain relatively controlled, rather than becoming more autonomous. Some participants who find it difficult to control weight wanted to lose weight for more external reasons such as a desirable physique. This however represents an extrinsic goal (a goal that is relatively more external to self) (Sheldon, Ryan, Deci, & Kasser, 2004). Extrinsic goals are less likely to directly satisfy psychological needs thus are not inherently rewarding to pursue. The goal of weight loss for appearance could be inherently satisfying if achieved.

In the obesity context, participants reported a lack of perceived importance of health as a meaningful rationale for change similar to smokers, but participants also felt that weight loss is difficult and requires a complete change of eating and physical activity habits. A similar picture of a healthy person and healthy lifestyle emerged in a study exploring barriers towards behaviour change among Australian adults (The Social Research Centre, 2010). A healthy person was described as someone who on a typical day would get up at 6am, exercise before breakfast and would have a healthy mid-morning snack; while an unhealthy person would get up late and have a coffee and a cigarette instead of breakfast. Individuals in that study acknowledged many benefits of a healthy lifestyle such as feeling energetic; at the same time they felt a healthy lifestyle is not desirable, not realistic and healthy persons would not enjoy life. Similarly, a healthy lifestyle was not perceived as aspirational from a study of Danish men who felt motivated to lose weight (Sabinsky, Toft, Raben, & Holm, 2006). These findings were also found in an earlier review examining public perceptions of

healthy eating that included 38 studies (both qualitative and quantitative). It concluded that healthy eating included a lot of fruit and vegetables; 'healthy' meat (such as chicken instead of red meat); low levels of salt, fat and sugar; quality food such as homemade food and involved a concept of balance and moderation (Paquette, 2004).

Individuals trying to lose weight who took part in the current study felt they would not be able to meet the challenge of healthy eating or exercising regularly, suggesting a lack of perceived competence to enact the necessary changes. Competence is defined as the experience of feeling effective in the interactions with the environment, and it is facilitated by conditions that offer optimal challenges for people's skills and capacities (Deci & Vansteenkiste, 2004); a lack of competence is associated with less internalisation of motivation. Past work in diet and physical activity settings has demonstrated that satisfaction of the need for competence is important for healthy functioning (Standage & Ryan, 2012). A number of studies have demonstrated that competence is associated with exercise participation (Wilson and Rodgers, 2003; Rose et al., 2005; Thogersen-Ntoumani & Ntoumanis, 2006). In a study by Silva et al. (2011) exploring predictors of successful long-term weight maintenance following participation in a weight loss intervention, perceived competence among other SDT constructs was associated with sustained moderate and vigorous exercise which mediated long-term weight loss maintenance.

Taken together, this finding could suggest that health promotion has been successful in conveying the message as to what behaviours should be addressed when attempting to control weight; however, it also has some unintended consequences by creating a perception that a healthy lifestyle might appear unattainable or overwhelming. This perception might undermine people's perceived competence for healthier behaviour as they might not feel effective in the interactions with the environment and would not be able to attain important health outcomes. Therefore health promotion policies might need to focus on messages about 'small steps' as too much information may undermine competence and create the perception of an overlap between healthy eating and a weight loss diet. Such approaches might also convey a different rationale for behaviour change (i.e. not a health rationale); however, this is discussed in more detail in the section on practical policy implications.

Predicting what approach would help

While it appears that both smokers and people trying to lose weight, had insufficient motivation to enable them to take action, the majority of them listed a number of approaches that they felt would influence their motivation for behaviour change. The introduction of incentives received the highest support from both groups as they felt that financial or non-financial assistance from the government would enable them to translate their intentions into behaviour and achieve a long term behaviour change (i.e. sustained weight loss and successful long term quitting). This is in line with other studies exploring perceptions about financial aspects of smoking cessation or weight loss which show that the support for financial incentives is high among smokers and overweight/obese people (Bonevski, Bryant, & Paul, 2011; Bonevski, Bryant, Lynagh, & Paul, 2012; Long, Helweg-Larsen, & Volpp, 2008). However, while participants in the current study felt financial incentives would motivate them to enact changes, a number of studies that investigated the use of incentives in health promotion, showed that although incentives could be quite effective in producing short term changes, they are not effective in producing sustained change (Kane, Johnson, Town, & Butler, 2004). A Cochrane review on the use of incentives for smoking cessation which included 17 studies concluded that incentives do not enhance long term abstinence (beyond six months) although they might be more effective in the short term (Cahill & Perera, 2008). Another review looked at 47 randomised control trials investigating the effects of the use of incentives on simple behaviours (such as immunisation) and complex behaviours (such as weight loss). Incentives produced a short term change (74% of the time for simple behaviours and 72% for complex behaviours), but they were not effective in producing sustained change; in all the studies that examined complex behaviour, participants returned to the baseline outcomes (Kane et al., 2004). Another systemic review of the impact of financial incentives on weight loss, demonstrated that at 12 or 18 months there was no significant effect of the use of financial incentives on weight loss or maintenance (Paul-Ebhohimhen & Avenell, 2008).

These findings are also consistent with SDT theory, which suggests that external rewards for behaviour undermine intrinsic motivation as they shift the perceived locus of causality from internal to external, and thus undermine people's responsibility for motivating or regulating their behaviour (Deci et al., 1999). For example, Ryan and Brown (2005) demonstrated that the use of incentives to motivate teachers to enhance educational opportunities did not have positive outcomes; teachers perceived the incentives as pressure to improve children's performance which in turn resulted in teachers using more controlling approaches towards children. The use of incentives to motivate teachers had also some unintended consequences, in that it resulted in the restriction of learning rather than

improvement of learning opportunities: students were spending considerably more time practicing for testing. In contrast, a recent overview of the literature on incentives for health-related behaviours did not find an undermining effect of rewards for health related-behaviours (Promberger & Marteau, 2013). Authors of this review argued that the undermining effect of incentives has been demonstrated for behaviours for which baseline intrinsic motivation was high and this was shown only for simple tasks such as solving a puzzle. Although this review included a wide range of health behaviours including smoking and weight loss, the majority of these studies have not measured the effect of incentives on motivation; but it was assumed that if there was no difference in health outcomes among those offered an incentive and those not, no undermining effect on motivation was present. More research evaluating the influence of incentives on motivation is needed as the influence of financial incentives on intrinsic motivation has not been rigorously evaluated.

Although participants of the current study felt financial incentives were appealing and might have helped them to address their behaviour, participants' narratives might also suggest that they were not good at predicting what approach would help them. For example, a majority of individuals who find it difficult to control their weight felt that simple advice from their doctor about weight status might be effective in this regard for some people. There is some support for this notion in the literature; a recent meta-analysis of twelve studies including a total of 207 226 patients examined the association between health professional advice and patient weight loss (including studies where participants received advanced counselling as well as simple diagnosis of obesity) (Rose, Poynter, Anderson, Noar, & Conigliaro, 2012). Eleven studies reported a positive relationship between health provider advice and enhanced patient effort in weight reduction. The majority of participants of the current study were advised in the past by their GP that their weight posed a risk to their health and it would be beneficial for them to lose weight; however, this simple advice did not have an effect on participant eating behaviour or physical activity habits.

A number of studies have shown that while people are good at adapting to different situations, they are not good at predicting how their preferences will change and tend to overestimate the impact of both positive and negative events on their lives. For example, there are large discrepancies between estimates of the quality of life between patients who suffer a given condition, and the general public asked to imagine what would be the impact of having this condition on their quality of life (Ubel, Loewenstein, & Jepson, 2003). A seminal study contrasted levels of happiness of recent lottery winners and people who recently suffered in an accident and had become paraplegic or quadriplegic. Their levels of

happiness did not differ substantially (Brickman, Coates, & Janoff-Bulman, 1978). People also appear to be poor at predicting how their preferences or views will change. For example, people predict that they will be happier with more income, however they do not appear to be happier as they fail to predict that with the growing income their aspirations will also grow (Easterlin, 2001). This also applies to public health policies where people commonly change their attitudes once the legislation is in place. Support for the smoke-free legislation introduced in Ireland in 2004 increased from 43% to 83% after its introduction (Fong et al., 2006). Therefore smokers and overweight adults in the current study might have overestimated the impact of incentives on their motivation and subsequent behaviour. These findings taken together question whether policy should be based on what people think would help them as such predictions might not be accurate.

3.6.2 Policy implications resulting from these empirical studies

Smokers and people who find it difficult to control their weight displayed a strong within-group differentiation and they felt that they differed from an average smoker or an average overweight person. McKay and Dennett (2009) have argued that these positive illusions are an evolved human trait, serving an adaptive function by motivating adaptive behaviours. This notion is further supported by brain imaging studies which suggest that the amygdala (which modulates cognitive processes using emotions; Phelps, 2006) and the rostral anterior cingulate cortex (conveying motivational and emotional information, Vogt & Pandya, 1987) play a key role in maintaining optimism (Sharot, Riccardi, Raio, & Phelps, 2007). Therefore, this illusion of superiority might not be subject to alteration, but should be accepted as part of normal human functioning. This would have important implications for tobacco control and obesity policies in understanding why individuals might not respond to standard obesity or tobacco control approaches, as they would not perceive these as targeting them personally. Therefore alternative approaches might be needed.

A number of possible obesity policy approaches have stemmed from the current study. These include:

1. Introducing policies to increase people's accurate awareness of their weight status.
2. Normalising behaviours that support a healthy weight, and having a healthy weight.
3. Influencing public attitudes towards policies in order to increase their acceptability

1). Increasing people's accurate awareness of their weight status

Normalising behaviours that support a healthy weight should encompass two dimensions: being healthy in terms of body size, which is considered important in terms of fostering motivation to change, and leading a healthy lifestyle, which may be important for people in sustaining behaviour and weight change. One means of modifying perceptions of what is a normal body size may be through opportunistic weighing and measuring within primary care, and providing weight loss advice to patients with a BMI over 25. Although being aware of the BMI or being given weight loss advice might not be enough to motivate individuals to take action to control their weight, this might be a helpful approach in correcting weight misperceptions as individuals would be aware of their weight status, and potentially more receptive to other community- and media-based health messages referring to people with a similar BMI. GPs or nurses based in the GP practices could be incentivised to measure and record the BMI of every patient, in a similar way to how they are currently incentivised by the Quality and Outcomes Framework (QOF) to record smoking status and cessation advice. QOF was introduced in 2004 to incentivise GP practices for the provision of healthcare and although it is voluntary, nearly all GP practices in the U.K. participate (Cashin, 2011). Such an approach has proven effective in prompting people to recognise smoking as bad for their health; since the introduction of the target for smoking in 2004, a significant increase in the recording of smoking status and smoking advice has been observed and this increase has been sustained (Taggar, Coleman, Lewis, & Szatkowski, 2012). For example, a study which analysed health records from 14 socioeconomically diverse English GP practices demonstrated that valid smoking status was available for 95.8% of patients (Dalton, Bottle, Okoro, Majeed, & Millett, 2010).

Since 2006/2007, practices have been rewarded for establishing and maintaining a register of obese adults (individuals over the age of 16 with a BMI of 30 or over) (Public Health England, 2011); however, this only provides a register of obese patients and GPs do not provide support for weight loss, therefore calls have been made to incentivize obesity management with the use of QOF (ASO, 2014; Haslam, 2014). Although on average each person in the UK has a GP practice consultation 5.4 times per year (ONS, 2010), there are many adults (men in particular) who would rarely see their GPs, therefore more widespread approaches that would reach a wider audience and approaches that would help individuals monitor their weight at regular intervals—as weight is likely to increase with age (Johnson et al., 2008)—could be introduced. For example, in 2009 England introduced a population-wide prevention program for vascular diseases- National Health Service Health Checks. This programme aims to identify adults between the ages of 40 and 74 at risk of cardiovascular disease and those identified to be at risk are offered lifestyle modification

advice and are invited annually for a review of their condition(ref). For each individual smoking status, BMI, lipid levels and blood pressure are recorded. An evaluation of this programme in patients from 29 practices showed that 44.8% of invited patients attended their check-up; however, there were significant differences in uptake such as lower attendance among younger men or smokers (Dalton, Bottle, Okoro, Majeed, & Millett, 2011). Therefore this population based programme might offer a valuable approach for increasing people's awareness of their weight status and adherence to this programme could be improved by for example sending a patient information leaflet or an invitation letter from a GP (Hewitson, Ward, Heneghan, Halloran, & Mant, 2011).

2) Influencing social norms around behaviours that support a healthy weight

Smokers and ex-smokers believed that the biggest benefits of tobacco control policies were derived from the de-normalisation of smoking. This process was a gradual one over many years which was strengthened by the recent implementation of the smoke-free law which 'removed' smoking from public enclosed spaces. In the obesity context, it would be worthwhile to explore whether a shift in social norms regarding behaviours that support a healthy weight could be influenced by public policies, and if achieved would bring similar benefits. The equivalent to the effect of smoke-free legislation may be reducing our exposure to seeing the consumption of unhealthy food, by for example placing restrictions on where people can eat (e.g. ban eating on public transport in cities) or by reducing opportunities to purchase unhealthy food (e.g. by limiting the number of fast food outlets or placing restrictions on the locations of such places). Although these approaches might be directly transferable in their aims, they may not be considered equivalent or justified in terms of the relative restriction on people's liberties (Nuffield Council on Bioethics, 2007), and it is likely that people would perceive such measures as extremely controlling. Therefore, a policy approach that would prompt positive behaviour rather than punish unwanted behaviour may be more likely to be accepted. One such approach is conducting mass media campaigns that aim to provide a positive normative feedback; rather than conveying the message that almost two thirds of British adults are either overweight or obese (which might exaggerate the perceived norm and create the perception that being overweight is normal), a message that the majority of adults consume four portions of fruit and vegetables per day (The Health and Social Care Information Centre, 2013) might help to create the perception that being healthy is normal. This message could be further strengthened by conveying the impression that being healthy is attainable (as some participants in this study doubted whether it is possible to maintain a healthy weight through reasonable food intake), for example by supporting a campaign that would encourage individuals to swap one unhealthy

snack for a healthier one including fruit or vegetables, i.e., that a healthy diet can be achieved by a 'one step at a time' approach.

Participants in both populations felt that the current environment exerts a significant effect on their ability to address their unhealthy behaviours. Smokers and ex-smokers felt that tobacco control measures that change the environment such as removal of tobacco vending machines or smoke-free legislation have improved their ability to accomplish the goal of quitting or smoking less. In contrast, participants in Phase 2 felt that they were either unaware of positive policies to promote healthy eating, or felt these were insufficient to counter the unhealthy norm set by for example food marketing activities. Therefore, the task facing smokers and those trying to improve their diet in terms of overcoming the environment may be different. For smokers, the environment was perceived to work with them to help them achieve the goal of quitting or smoking less, but those trying to lose weight struggle to change their eating habits against an environment in which their intentions were often undermined. This suggests that the introduction of obesity policies which aim to reshape the environment and make being healthy convenient might help to shift the norm into healthy-normal and help individuals to lead healthier lifestyles. This could be achieved by for example increasing the availability of fresh fruit and vegetables. Although programmes increasing the availability of fresh fruit have already been introduced on a wide scale (for example Change4Life Convenience Shops or Scottish Healthy Living Neighbourhood Shops, AC, DH), their evaluation focused on the increases in shop sales and fruit and vegetables purchased, rather than changes in perceived social norms. In addition, evidence from tobacco control suggests that such approaches would have to be comprehensive (i.e. involve the majority or all stores, including convenience stores and supermarkets), be introduced simultaneously with other programmes that would strengthen its effects (e.g. mass media health promotion campaigns) and be present for a long period of time (e.g. 20 years).

3).Influencing attitudes towards policies in order to increase their acceptability

The results from the current study and from the literature suggest that individuals might not be successful in predicting how their preferences will change once the legislation is in place (Fong et al., 2006). People may initially raise concerns regarding a new law or policy, but change their attitudes after the legislation implementation when they have a chance to experience what the change means for them. People also tend to support approaches that do not directly affect them, such as education campaigns (Diepeveen et al., 2013; Emm et al., 2013); however, such approaches might be less effective in influencing behaviour

compared with more restrictive policies such as tax increase (Powell & Chaloupka, 2009) which due to low public support politicians might not be likely to introduce (Page & Shapiro, 1992). Therefore, shifting public attitudes may be a prerequisite to gaining political support for introducing more restrictive policies with a greater potential for public health impact.

One approach which was found effective in this regard is changing beliefs that underlie such attitudes and provide the public with information regarding harmfulness of a given behaviour via for example mass-media health campaigns (Diepeveen et al., 2013). In a study by Blake et al. (2010) investigating factors associated with support for tobacco control measures, those who had seen counter-advertising warning of the effect of passive smoking to children were 40% more likely to support the restrictions on sale of tobacco products. Another approach to sway public attitudes is to inform the public about the effectiveness of a given approach in addressing given behaviour. For example, in an experimental study exploring support for financial incentives for weight loss and smoking cessation, participants were more likely to support the use of grocery vouchers for weight loss when they were told that such an approach was effective for 20% of people compared with those who were told it was effective for 10% (Promberger, Dolan and Marteau, 2012). Therefore if public opinion is conditional upon the information provided, framing policies in a way that is aligned with the population's values and beliefs (e.g. which presents trade-offs for the given policy option), may influence their acceptability.

Another approach to influence public attitudes towards policies is to frame the consequences of such policies in terms of core moral values, such as fairness to those who might gain by change in behaviour (Diepeveen et al., 2013). For example, a survey by YouGov demonstrated that 64% of respondents supported the plain packaging of cigarettes when they were told that this would not give a false impression that some cigarettes are healthier than others. However, the support increased to 80% when the outcomes of plain packaging were framed in terms of effect on children (that cigarettes will be less appealing to children) (ASH, 2011). These two approaches could be combined (targeting beliefs regarding the intervention as well as core values) and for example limiting the number of fast food outlets could be justified by the rationale that there are much higher levels of obesity in communities with high concentrations of fast food outlets, and that by reducing the number of such outlets we could help prevent a high number of children becoming obese.

3.6.3 Future research

Little is currently known about the mechanism of tobacco control action, that is, how policies that are introduced on a global level affect individual level motivation and behaviour. The current study aimed to provide some insight into individuals' motivation for behaviour change in response to the legislation. The current study has shown how the application of SDT has provided a link to theory and past work that could help in the understanding of people's motivational responses to tobacco control and obesity policies. In particular, understanding how people's basic psychological needs are influenced by the social and physical environment, can offer an insight into the social norms within which they live. Therefore SDT may be useful in understanding how the mechanisms for certain policy approaches work, and providing a starting point for designing more autonomy supportive interventions. However, this is little studied. Results from the current study suggest that people trying to lose weight perceived the size of the task of changing eating or physical activity habits as off-putting which might suggest that the lack of engagment with obesity policy is in part mediated by competence. However, research applying the basic needs constructs to eating and physical activity behaviours is still in its relative infancy, therefore there is considerable scope for more research exploring individuals' need satisfaction within the eating and physical activity domain.

Conveying messages to the public about the importance of having a healthy weight and healthy lifestyle poses a number of questions for future research. One such question is to further explore whether perceptions of healthy eating can be separated from restrictive dieting activities, to help people to understand that a healthy diet could be achievable and sustainable for them. The narrow definition of a healthy lifestyle that participants in the present study appeared to hold, may be a counterproductive effect of campaigns that promote healthy living that inadvertently create a perception that many changes have to be introduced making the goal of a healthy lifestyle neither attainable nor desirable. New research should explore whether a different approach may be more acceptable and less likely to undermine people's sense of competence, for example asking people to change only one aspect of their diet (e.g. introduce one extra portion of fruit a day).

A third area for future research is in adding to the literature in the domain of media messages regarding obesity. A first step in the current study was to show participants materials currently available about the risks of being overweight, and it was notable that participants felt that such health messages were not personally relevant if they did not resemble in size the individual pictured in that information (particularly over-sized, and

morbidly obese models). It appeared that they used the photo included in the article to interpret the article's message. Therefore it is possible the use of photos of models, especially photos depicting morbidly obese models in a stereotypical way (e.g. eating junk food), might prevent identification with the message. More studies exploring the effect of the use of photos of morbidly obese models on message comprehension and acceptance are warranted.

3.6.4 Limitations

This study was an exploratory study and included a self-selected sample from a small geographical location; therefore the results cannot be generalised to the wider population. This might be important for smokers and ex-smokers as deprivation and socio-economic disadvantage are important in tobacco research as smoking is one of the leading causes of health inequalities (Thomas et al., 2008) and smokers and ex-smokers who took part in the current study were White British and were recruited from one area, which according to the Index of Multiple Deprivation is in the least deprived 30% of local authorities in the country (Bath & North East Somerset Council, 2011). However, the socioeconomic status of the individuals recruited was not measured therefore it may have varied from the local average.

Smokers and ex-smokers recruited from the smokers' panel might have had stronger or more defined views on tobacco control compared with participants who were not panellists. The smokers' panel had met twice before the study began, thus smokers had a chance to talk about different measures and they were more aware of the governmental initiatives aimed at reducing smoking rates. Ex-smokers who were recruited from the university staff body expressed a view that it was difficult for them to answer some of the interview questions relating to tobacco control as they had never thought about this topic. It is possible that they might have benefited from information on what policies are currently in operation, and time to reflect on this prior to the interview to have a similar level of awareness compared with members of the smokers' panel. It is also possible that the inclusion of a more diverse sample including for example people who quit smoking but relapsed could have helped to provide a wider picture of smokers' motivational responses.

Approximately half of the sample of Phase 2 did not take part in the moderated discussion and only watched a pre-recoded on-line presentation. These participants did not have a chance to discuss their views with other study participants. However, it appears that the views of those who attended the discussion group and those who did not did not differ. Discussion groups turned out to be gender specific, although this was not an intended aim,

so women did not have a chance to discuss their views with male participants. Another limitation is the recruitment of individuals who were aware of their weight status and who had tried to control their weight in the past thus findings might not be generalizable to people who are not aware of their weight status or not concerned about the negative health that excess weight poses. Insight into the difference that this may make is provided by a large scale market segmentation study conducted in Australia before the introduction of the *Measure up* campaign which aimed to help people decrease the risk of chronic disease (Bluemoon, 2009). Five groups were identified: Avoiders, Postponers, Balance Attainers, Help Seekers and Endeavourers. Two of the identified groups (Help Seekers and Endeavourers) appeared to hold similar characteristics to the current sample. Both groups were aware of their health status, wanted to introduce changes, but found it difficult and had many failed attempts. The main difference between these two groups was the perception of their health status, with Endeavourers perceiving themselves as quite healthy, and Help Seekers rating their health as worse. Thus, if the current study was successful at recruiting only these two groups, important views of for example Avoiders who do not think they need to introduce any life changes would not be represented. The present study used quite a complex design for a qualitative study. Although the discussion group was aimed to be presented in a neutral manner, it presented participants with a complex picture regarding causes and possible solutions to obesity. This could have affected participants' subsequent views expressed during the interview. There is evidence that this was the case as some participants expressed a view that they were more aware of the environmental influences on obesity such as the number of shops selling unhealthy take away food as a result of attending the discussion group/ watching a pre-recoded on-line presentation.

Although all data collected were transcribed and analysed, only a subset of themes was explored in more detail. This was because this study focused on the motivational responses of individuals to tobacco control and obesity policies. It is possible that other researchers may have different views within the same themes or judge other themes to be more important for the current study. However, as recommended the description of theoretical rigour (credibility, dependability and transferability, Krefting, 1990) has been provided to demonstrate how the researcher reached the conclusions presented here. However, the ontological stance taken (subtle realism) is in line with interpreting the findings via the subjective view of the researcher, and acknowledging the context within which the study has occurred.

One way to ensure the trustworthiness of the data collected was to seek respondent validation; however despite multiple contact attempts, no response was received. It is

possible that participants agreed to read the overall study results as it was a socially expected response of agreement rather than a true interest in the study (Bloor, 1978). Participants' perspective could have broadened the interpretation and it is also possible that participant responses could have differed from researcher interpretation. Such disagreements or challenging perspectives could have been added to the study report as 'dissenting minority reports' (Walker, 1974; Bloor, 1978; Lincoln & Guba, 1985).

3.6.5 Conclusions

This study focused on comparing and contrasting the perspectives of smokers, ex-smokers and people who find it difficult to control weight regarding their response to the legislation. A number of similarities and differences emerged between these two contexts. Not smoking was perceived as the norm in public places. Smoke-free legislation has shown that the process of smoking 'de-normalisation' and public disapproval of smoking has an important role in shaping smoking behaviour in public places and that smokers make social adjustments to manage the impact of the smoke-free legislation. In an obesity context, being overweight, eating an unhealthy diet and not being physically active was perceived as the norm, while being a healthy weight was perceived as something difficult and requiring a substantial effort. They felt their diet attempts were further hindered by an environment which does not support healthy living (e.g. as unhealthy food is widely available).

Both smokers and individuals who find it difficult to control their weight had perceived low motivation for behaviour change. Smokers who although were relatively identified in their motivation to not smoking in public places, were not motivated to quit smoking. Similarly people trying to lose weight felt they were motivated to lose weight, but unable to translate their intentions into action. They perceived low social support for a healthy lifestyle, low competence for behaviour change and an environment that promotes unhealthy living as important barriers for introducing necessary changes. Tobacco control measures (apart from the smoke-free legislation) were perceived by smokers as controlling, undermining choice and exerting pressure to behave in certain ways and they were not willing to engage with services provided to help them quit smoking. Similarly individals who find it difficult to control their weight, were not likely to seek help such as using commercial weight loss services. One reason for the lack of engagment was the perception of being unique compared with an average smoker or an average overweight person and the perception that the services offered would not work for them as they do not take into account their individual characteristics. Findings also suggest that smokers and people trying to lose

weight think about tobacco control and obesity policies in terms of what would be useful for them versus for other people.

This might suggest that tobacco control and obesity measures are not perceived by these individuals as supporting their attempts for behaviour change (not perceived as autonomy supportive). In contrast, ex-smokers perceived current tobacco control as helpful in helping them to quit smoking or not relapsing which suggests that policies are interpreted more autonomously once an individual's own motivation is more autonomous. These findings also suggest that introducing policies that do not rely on active engagement, such as laws or regulations and introducing them in an autonomy supportive way (e.g. providing a meaningful rationale for introducing the measure), might be more effective in promoting sustained and self-endorsed behaviour changes. Moreover, policies that aim to increase individual autonomous motivation might increase engagement. According to SDT, a more supportive and encouraging communicating style might lead to more autonomus motivation and maintained behaviour change. These findings also demonstrate that SDT might be a useful framework for understanding individual responses to legislation as it provides insights into complex interrelationships between basic need satisfaction, factors affecting motivation at different levels, regulation at various levels (e.g. situational motivation) and other SDT constructs such as extrinsic or intrinsic goals.

The next two parallel studies (Study 2 and Study 3) will aim to answer two questions posed by this study. Study 2 will aim to answer a question as to whether the use of images of overweight and obese models in the media affects how people perceive health-related messages. This will contribute to the evidence base of whether the use of photos of morbidly obese individuals in for example obesity campaigns affects message comprehension and prevents identification with the message. Study 3 will be a pilot study of an intervention that aims to address an aspect of social norms regarding healthy eating (that there is no support for a healthy lifestyle and that a healthy lifestyle is difficult to achieve). More specifically, the intervention will address perceived low motivation for behaviour change, low competence for behaviour change and low social support for a healthy lifestyle.

CHAPTER 4: Can images of obese people convey the wrong message? Responses to weight-related health promotion messages according to body size of models in accompanying photographs.

4.1 Introduction

Study 1 (Phase 2) provided a summary of findings of the qualitative exploration of responses to existing and hypothetical future obesity policies and their potential impact on motivation for behaviour change. During interviews, participants were presented with the BBC Health online news bulletin *Being Overweight Linked to Dementia*. The article was accompanied by a picture of a middle-aged obese man struggling to fit into a chair or struggling to get out of the chair. Participants felt the message did not apply to them as they did not resemble the pictured individual in terms of the amount of excess weight (P1 [female, BMI 31.5]: '*I don't see myself as being that obese'*) and felt they were not at risk of dementia as they perceived themselves to be significantly slimmer from the pictured individual. Leading on from these findings, this chapter aims to test the hypothesis that the presence of an exaggerated obese model accompanying articles about the health risks of being overweight (rather than obese) might affect message comprehension and prevent message identification in a larger, more representative sample of the population. In keeping with the overall aims of the thesis to explore the mechanisms of the effects of societal/policy level influences on people's motivation, factors that might be associated with perceiving the message as personally relevant will also be explored.

Health education and promotion

As argued in Chapter 2, a large part of obesity policy should focus on obesity prevention as the success of obesity treatment is limited (Kumanyika et al., 2008). One strand of obesity preventive approaches is improving population awareness about the negative consequences of excess weight and inactivity and about the benefits of healthy eating and physical activity by the introduction of health information and communication strategies (Cecchini et al., 2010). According to social cognitive models, individuals who are well informed about the negative health consequences of being overweight would be more likely to address their unhealthy habits, as understanding and recognising the risks that being overweight poses is a key factor that influences how much attention people pay to their weight, or take action in relation to it (Conner & Norman, 1996; Darnton, 2008b). Although awareness is not sufficient for people to take action, it may be necessary. This would

suggest that individuals who are well informed about the negative health consequences of being overweight would be more likely to address their unhealthy habits. Therefore, overweight individuals should be informed about the negative consequences of excess weight in a way that they perceive as personally relevant as this may increase the likelihood of taking action to address their weight.

Better understanding of the factors that predict or prevent a person's identification with a health message would enable us to design public health campaigns that the public are more likely to perceive as personally relevant. Examples from current and recent campaigns in the UK suggest that identification with healthy lifestyle campaigns is typically low (Craig, Bauman, Gauvin, Robertson, & Murumets, 2009; Huhman et al., 2005; Peterson, Abraham, & Waterfield, 2005; Pollard et al., 2008; Wardle, Rapoport, Miles, Afuape, & Duman, 2001). In the evaluation of the BBC's *Fighting Fat, Fighting Fit* campaign, few people were found to actively engage (less than 1% registered for the scheme by sending back the registration form), although the majority (57%) of participants had heard about the campaign (Wardle et al., 2001). In a 4-week national Scottish mass-media campaign to increase walking, extensive coverage was achieved (70% awareness level), but only 5% actively engaged (called the Fitline) (Wimbush, MacGregor, & Fraser, 1998). However, the veracity of the hypothesis that such campaigns are not perceived as personally relevant cannot be established as campaign evaluations do not include a measure of message acceptance.

One of the factors that could prevent identification with health messages is the nature of the images accompanying the health message (Heuer et al., 2011). Previous research has shown that such images might have a strong effect on people's responses, as the individual's eyes are drawn to the picture first (Garcia, Stark, & Miller, 1991). As such, visual images appear to frame message perception beyond a person's level of awareness (called visual framing), and might affect how readers interpret the message (Messaris & Abraham, 2001). As to the effect of the use of images in articles concerning obesity, a well-established finding is that images that depict obese persons tend to present them in a stigmatising way (Heuer et al., 2011; McClure et al., 2011; Puhl, Peterson, DePierre, & Luedicke, 2013), which results in increased anti-fat attitudes among the article's readers, irrespective of their own weight status (McClure et al., 2011). This might in turn result in lower engagement with the message as people might be trying to distance themselves from the group they hold negative attitudes about. There is some support for this notion; in a qualitative study exploring attitudes of obese Australian adults towards public health messages about obesity, participants felt that they did not identify with behaviours of people depicted in such campaigns as they were usually shown in a stereotypical, stigmatising way (Lewis et al.,

2010). However, in another qualitative study exploring the parents of young children's views on images of adults and children that could potentially be used in health promotion materials (DH, 2008b), participants dissociated from the message irrespective of the model size. However, no quantitative studies exploring this notion (i.e. the effect of the size of the models in photos accompanying written material regarding weight and weight control on message comprehension and acceptance) were identified.

As visual images are increasingly being used to attract readers to read the text (Zillmann, Knobloch, & Yu, 2001) and with media (e.g. television, print newspapers and online sources) being an important source of health information (Eastin, 2001; Eysenbach, Powell, Kuss, & Sa, 2002), exploring whether these images might affect understanding and acceptance of the message as personally relevant is important. Given the extensive use of exaggerated models in the media (Patterson & Hilton, 2013), exploring the impact of this on message acceptance is important as it might prevent identification with the message. It is particularly important to explore the impact of the mismatch between the images and the text presented, i.e. use of images of obese, and morbidly obese individuals (i.e., BMI >30, or > 40) in communicating messages about the negative health consequences of being overweight (i.e., a BMI>25 but <30). Results from Study 1 suggest that such mismatch between the message and the photo might affect understanding (i.e. that a higher weight is needed for the negative effects of excess weight to occur), and as a result lead to lesser chance that people will identify with the message.

Other factors might also play a role in perceiving the message as personally relevant. Study 1 demonstrated the utility of exploring the mechanism of people's responses to social climates through the lens of SDT. Building on this, the present study will also draw in SDT by exploring the impact of people's existing motivation towards improving their health and their response to that message. According to SDT, a person's motivation can be described along a continuum of self-determination from more controlled (e.g. through coercion) to autonomous (i.e. consistent with personal values and meaning) regulations (Deci & Ryan, 2002). More self-determined motivation is associated with greater interest, and engagement with information relating to that behaviour; therefore, individuals who are more autonomously motivated to control their weight would be more likely to pay attention to the message and perceive it as personally relevant. However at the same time, the photos used might have an additional effect on people's motivation as different contextual events are important for integrated internalisation; an important event is having a meaningful rationale that would help the person understand why self-regulation would have a personal utility (Deci et al., 1994). For example, if an overweight individual is presented with a photo of a

morbidly obese model accompanying health information about being overweight, they may reach a conclusion that as s/he is considerably slimmer than the pictured individual the message is not relevant to them. As such, the inclusion of the photo would not provide a meaningful rationale for weight control, and be unlikely to promote the internalisation of motivation towards weight control activities. This study will explicitly explore this theoretical hypothesis, by assessing the impact of the size of the model presented in the photo on participants' motivation towards weight control. Work from other behaviour domains (e.g. smoking) suggests that a person's own level of risk behaviour may further influence their evaluation of the personal relevance of messages (Visschers, Meertens, Passchier, & De Vries, 2009); as such, participants' perceived body size and current perception of whether or not they considered themselves to be overweight may influence this (Timperio et al., 2000). Similarly, a person's level of concern regarding their health may affect their response to risk information (Timperio et al., 2000).

Article selection

A pool of articles reporting on the health risks of being overweight was collated from the BBC News Website, which has the highest online readership (for example it had 10 million unique readers in July 2011) (PressGazette, 2011). Selection between articles was made according to the following criteria:

1. Accurate, simple and clear communication of the health message about the health risks associated with being overweight.
2. Use of the term 'overweight' rather than 'obese', to increase acceptability and reduce the risk of reinforcing stigmatising formats (Gray et al., 2011; Volger et al., 2012; Weight Concern, 2008).
3. Focus on coronary heart disease (CVD), given that this is a well-recognised and accepted health risk of obesity (British Heart Foundation, 2012) so would provide a believable/uncontroversial story resembling other media messages regarding obesity.

4.1.1 Research question

This study aims to test the following hypotheses:

Hypothesis 1: The presence of an exaggerated overweight model alongside a factual article about the risks of being overweight will influence what participants perceive a person at risk to look like (i.e. that a higher weight is needed for the negative health consequences of excess weight to occur).

The effect of the use of morbidly obese models on comprehension will be explored separately for healthy weight vs overweight/obese participants.

Hypothesis 2: The use of an exaggerated image will undermine autonomous motivation towards weight loss, relative to an accurate image or no image.

This study will also aim to answer the following research questions:

Do demographic characteristics, and weight-related cognitions moderate health message acceptance?

4.2 Methods

4.2.1 Participants

A power calculation was based on the primary analysis, comparing the primary outcome across the three study conditions (with 90% power and 5% significance level). As no previous studies exploring message acceptance and message comprehension were available and effect size was not known therefore a small effect size was assumed (0.25). Power calculations using the GPower software were conducted prior to the study which showed that 334 participants would be needed. The inclusion criteria were aged over 18 years and good command of English. Overweight individuals were predominantly targeted as they were the target audience of the article, and so the group for whom the message would be relevant. However, recruitment targeting only overweight adults might not be appropriate as many overweight individuals are not aware they are overweight (Falba & Busch, 2005; Gregory, Blanck, Gillespie, Maynard, & Serdula, 2008; Kuchler & Variyam, 2003). With current high UK obesity rates (National Obesity Observatory, 2011b), it was anticipated that the recruitment of all eligible adults would result in a high proportion of overweight participants. Recruiting both healthy weight and overweight participants would also enable a comparison of responses between these two groups. Participants were recruited through university press release in local press, adverts on the electronic noticeboard at the university, posters/leaflets distributed around the University of Bath campus and social networking sites (e.g. Facebook). After 3 weeks of recruitment, although the response rate was satisfactory (around 250 participants took part by this time), the majority were within the healthy weight category. Therefore, members of the Big Panel, a public engagement group consisting of lay members with first-hand experience of weight loss, were invited to take part. An email was sent to approximately 500 members of the Big Panel.

4.2.2 Design of the study

The study used a randomised controlled trial, administered online. Participants were randomised to read an online health message about being overweight and having increased risk of heart disease presented with: (i) no photo, (ii) a photo of an overweight model (BMI between 25 and 30), (iii) a photo of a morbidly obese model (BMI>40). The images used were gender specific.

Study materials

Photos of overweight and obese models were taken specifically for the present study to ensure the subjects of the photos had provided their consent for this use, and to allow the subject's BMI to be more accurately estimated. Three models volunteered to take part: an overweight female model (BMI 29, based on self-report), an overweight male model (BMI 29.8, based on self-report) and a morbidly obese female model (BMI 41.5, based on self-report). The recruitment of a morbidly obese male model was unsuccessful, so a picture available on the internet was used and was judged to present a similar amount of central adiposity to the female obese model. Photos were presented in line with the typical portrayal of obese people in the media (Heuer et al., 2011), i.e. viewed from the front, shown without head, wearing close fitting street clothes. The same background (a street in London) was digitally applied to all four pictures, showing the models walking, visible from their neck down to their knees (see Appendix 4.1). Models who volunteered were given £20 shopping vouchers.

An article was produced specifically for the purpose of this study. The text used was adapted from an article reporting research published on the Science Daily website (see Appendix 4.2). It was adapted to resemble an article about the excess weight and the risk of dementia published in the health section of the BBC (British Broadcasting Corporation) website (see Appendix 4.3). A readability score was calculated for the BBC article and for the article used in the current study. The BBC article had 384 words and had a Flesch Reading Ease test score of 53.4 and average grade level 11.2- US system (should be easily understood by 16 to 17 year olds); while the adapted version had 281 words and a Flesch Reading Ease test score of 58.5 and average grade level 10.5 (should be easily understood by 15 to 16 year olds). The article used in the present study can be seen in Appendix 4.4.

4.2.3 Measures

Demographic characteristics Demographic variables assessed included: gender, age, weight, height, ethnic group, employment, education level obtained. Each participant's BMI was calculated as weight (kg)/ height^2 (m) and participants were classed as underweight (BMI <18.5), healthy weight (BMI between 18.5 and 24.9), overweight (BMI 25-29.9) and obese (BMI≥30) in line with standard medical criteria (WHO, 2013a).

Health consequences of obesity A measure of participants' perceptions of the health consequences of obesity was adapted from the Obesity Risk Knowledge by Swift et al. (2005). The original scale consists of 10 items asking about the knowledge of risks associated with obesity; however, it was shortened to include 4 questions and the terms obese or obesity were replaced with the term 'being overweight' or 'overweight' as the term overweight was found to be the most acceptable among overweight and obese patients when discussing excess weight (Dutton et al., 2010; Gray et al., 2009; Gray et al., 2011). Participants responded to the following four statements: *Being overweight increases the risk of developing high blood pressure; Being overweight increases the risk of getting certain types of cancers; Overweight people can expect to live as long as non-overweight people; There is a major health benefit if an overweight person loses weight*. Items were assessed on a 3 point scale (*true, false* or *uncertain*). Reported reliability of the original 10-item scale was Cronbach's alpha 0.70.

Perceived health status Participants were asked to rate their health on a five point scale (*poor, fair, good, very good or excellent*) and to rate their perceived weight as either *very underweight, somewhat underweight, about right, somewhat overweight* or *very overweight* (Wardle & Johnson, 2002). Current weight control activity, weight concern and perception of weight being harmful to health was assessed using a measure developed for use in a study by Timperio et al. (2000) measuring weight concern among Australian adults incorporating three questions: *Which category best describes you? (Not doing anything in particular for my weight/ Actively doing things to try to gain weight/ Actively doing things to try to lose weight/ Actively doing things to try to avoid gaining weight); How concerned are you about your weight? (not at all concerned/ not very concerned/ quite concerned/ very concerned*) and *Do you consider your weight as harmful to your health? (not at all harmful, not very harmful, quite harmful, very harmful*). This measure was piloted for clarity and comprehensibility with a sample of 15 adults (Timperio et al., 2000). Comparative risk of heart disease and stroke was measured using two questions: *Compared to others of the same age and sex, how would you rate your risk of having a heart attack/ a stroke within the next 10 years? a*ssessed on a 5 point Likert scale (Avis, Smith, & McKinlay, 1989).

Finally, participants were asked to indicate on a 9-figure silhouette scale the figure that most resembles them. The silhouette scale was taken from the Weight and Lifestyle Inventory (Wadden & Foster, 2006), a scale developed for behavioural evaluation of patients seeking bariatric surgery, showing appropriate discriminant validity (Wadden et al., 2006).

Reaction to article and article comprehension Participants' message acceptance as personally relevant was assessed using a one-item measure constructed for the present study. Participants were asked to rate their engagement with the article by selecting one of six possible options: (1) *I didn't read it*; (2) *I skimmed it and didn't really put much thought into it*; (3) *I read it, but didn't really retain much or get a clear message from it*; (4) *I read it, understood the message, but it doesn't really interest me*; (5) *I read it, found the message interesting, but it doesn't really apply to me*; (6) *I read it, found the message interesting and think it applies to me*. This scale was based on the principle of staging algorithms (e.g. Transtheoretical Model, Prochaska & DiClemente, 1983; Precaution Adoption Process Model, Weinstein & Sandman, 1992) which seeks to locate respondents on a continuum from zero to maximal engagement with particular issues or activities. Possible responses were generated by the research team and piloted with a sub-sample of respondents to ensure all appropriate responses were included. No psychometric validity of this measure was assessed. Due to the unequal distribution of responses across categories, this variable was re-coded as binary variable for analysis: *article could apply to me* vs. *it does not apply to me*. Recognition of the content of the article was assessed using two items: *In what scientific journal was the study described in the article published?* and *According to the article, how much more likely to develop heart disease are people who are overweight (BMI 25-30)?.* Finally, participants responded to one question regarding the size of the figure from which the risk of heart disease starts to increase (size risk threshold), which was assessed using 9-figure male or female silhouettes taken from the WALI (Weight and Lifestyle Inventory, Wadden & Foster, 2006).

Motivation for weight control Motivation towards controlling weight was assessed using the Treatment Self-Regulation Questionnaire (TSRQ) (Levesque et al., 2007) adapted to ask about weight control. The scale consists of 16 items, scored on a 7 point Likert scale from 1 '*not at all'* to 7 '*very true'* measuring three motivational domains: autonomous motivation (6 questions, e.g. *Because I personally believe it is the best thing for my health*), controlled motivation (6 questions, e.g. *Because I feel pressure from others to do so*) and amotivation (4 questions, e.g. *I don't really know why*). The scores on each motivational dimension are averaged to form the reflection of a given regulation type on a scale from 1 to 7 (e.g. a score of 6 on autonomous motivation would mean self-determined motives for

healthy eating). This scale was found to have an adequate reliability in previous studies (Cronbach's α ranging from .58 to .93) (Levesque et al., 2007; Williams et al., 1996).
The full set of measures used in this study can be seen in Appendix 4.5.

Cognitive interviews

Cognitive interviews using the 'think aloud' method were conducted with 5 respondents (one obese, two overweight, two healthy weight) testing for respondents' comprehension of the questions. Based on their comments some minor adjustments were made to improve clarity and comprehensibility of the questionnaire. For example, a question about life priorities was deleted as participants felt that the instructions were difficult to follow and the question took too long to answer.

Procedure

Participants completed all sections of the study online. Participants were told that the study explored how people respond to different media messages about obesity, but were not informed that images used would vary between conditions. After reading the Participant Information Sheet and consenting to take part in the study, participants were firstly asked about their gender to ensure that they have followed the correct link (if not they were redirected to the appropriate link). Then participants answered questions about the health risks of obesity and rated their perceived health. Participants were then randomised to one of three conditions:

1. Article with no picture
2. Article with a picture of an overweight model (BMI >25 and <30)
3. Article with a picture of a morbidly obese model (BMI>40)

Participants were then asked to read the article with a view to giving feedback on it later. On the next survey page they were asked five questions regarding their reaction to the article and article comprehension. Participants were not able to go back to the article. This information was clearly stated and a reason for this provided (*The survey will not allow you to go back to the article. This is because we want to see how much information you retained from the article. We will give you the correct answers at the end of the survey).* Then they answered questions about health consequences of being overweight and their motivation towards weight control. Finally, they were asked to provide details about their demographics. These questions were left to the end to avoid priming participants through asking about their weight. At the end, participants were thanked for taking part, were provided with correct answers and debriefed about the true purpose of the study. At this

stage participants were given an opportunity not to submit their answers if they felt deceived by not knowing the true purpose of the study.

Analysis

Data were analysed using IBM SPSS Statistics 20. The primary outcome measures were (i) size risk threshold (i.e. the figure identified on the 9-figure silhouettes scale at which the participant considered the risk of heart disease starting to increase) (Hypothesis 1), (ii) message acceptance as personally relevant. Size risk threshold was entered as a dependant variable into ANCOVA (controlling for perceived weight status) with participants' weight category (overweight vs. healthy weight) and study condition (obese model vs. overweight model vs. no photo) as independent variables. The analyses were repeated for overweight and obese participants separately, as a difference in responses emerged between participants according to their weight.

Message acceptance as personally relevant was explored among overweight and obese participants only, as they were the target audience of the article used in current study. Personal relevance of the article message was explored using binary logistic regression with message acceptance (*article applies to me* vs. *does not apply to me*) as a dependent variable. Potential moderating variables of these relationships were entered in three steps. In step 1, the predictor variables included six categorical predictors: experimental condition, gender, weight concern (not at all concerned/ not very concerned vs. quite concerned/ very concerned), education (higher degree vs. lower degree), obesity and high blood pressure association awareness and correctly answering question about the article; step 2 added six continuous variables (perceived weight discrepancy, heart comparative risk, weight concern, weight being harmful to health, BMI, age) and step 3 added autonomous motivation.

4.3 Results

4.3.1 Parametric assumptions

Parametric assumptions for all variables were examined. Kolmogorov-Smirnov test showed that none of the variables studied were normally distributed. To further explore how well the variables conform to a normal distribution, Q-Q chart plots were computed and revealed that variables were close to normal distribution, thus parametric tests were used. All variables studied demonstrated homogeneity of variance. Listwise deletion was used if participant's data for BMI was missing. Four questions from the Obesity Risk Knowledge Scale had very low reliability of 0.37. Motivation for weight control measuring three

motivational domains had the following reliability: autonomy motivation- Cronbach's alpha .88, controlled motivation .85 and amotivation .62.

4.3.2 Participants

587 participants completed the survey (98 participants abandoned the survey). The responses of 24 (4.1%) participants were not used in the analysis as the BMI, which is crucial for the analyses, was missing; therefore, the results in this study are based on the responses of 563 respondents. Participants' mean age was 38.01 years (SD=14.17), 90.2% (N=508) were classed as White and 68.4% (N=385) were educated to degree level or above. Mean BMI was 27.61 (SD=7.78). Eleven (1.9%) participants were classified as underweight, 46.4% (N=261) as healthy weight (BMI 18.5-24.9), 23.6% (N=133) as overweight (BMI 25-29.9) and 28.1% (N=158) as obese (BMI over 30). For analytical purposes participants were grouped into two categories: underweight/healthy weight (48.3%, N=272) and overweight/obese (51.7%, N=291). As all underweight participants were classified as being of moderate thinness (BMIs ranging from 17.33 to 18.40) according to the BMI criteria (WHO, 2013a), they were not excluded from data analysis.

In terms of differences between healthy weight and overweight/obese participants, healthy weight participants were younger, $F(1,562)=108.88$, $p< .01$, and better educated, $F(1,562)=11.89$, $p<.01$, while there were more females in the overweight/ obese group, $\chi^2= 7.90$, $p< .01$. Overweight participants were also more likely to rate their health as poor/fair, $\chi^2=56.47$, $p< .01$, more likely to be concerned about their weight, $\chi^2=140.67$, $p< .01$, more likely to be currently trying to lose weight or avoiding weight gain, $\chi^2= 63.53$, $p< .01$, and more likely to perceive their weight as harmful to their health, $\chi^2= 149.72$, $p< .01$ (for more details see Table 5.1).

4.3.3 Difference between conditions

181 (32.1%) participants were randomised to the overweight model condition, 198 (35.2%) to the obese model condition and 184 (32.7%) to the no photo condition.

Table 4.1 Demographic characteristics, weight concern and weight control practices by study condition and weight status.

	Healthy weight (48.3%)				Overweight/obese (51.7%)			
	Condition 1 (obese model) (N= 80)	**Condition 2 (overweight model) (N= 99)**	**Condition 3 (no photo) (N=93)**	**Total**	**Condition 1 (obese model) (N=118)**	**Condition 2 (overweight model) (N=82)**	**Condition 3 (no photo) (N=91)**	**Total**
Gender (% female**)**	66.2	61.6	60.2	62.5†	72.9	70.7	76.9	73.5†
Ethnicity (% White)	93.7	86.9	87.1	89.0	89.0	92.7	93.4	91.4
Education (% higher degree)	76.2	73.7	74.2	74.6†	64.4	67.1	56.0	62.6†
Perceived weight status								
Underweight/ about right	90.0	90.9	89.2	90.1‡	16.1*	22.0*	5.5*	14.4‡
Slightly overweight/ very overweight	10.0	9.1	10.2	9.9‡	83.9*	78.0*	94.5*	85.6‡
Health								
Poor/fair	8.8	12.1	9.7	10.3‡	22.9	30.5	35.2	28.9‡
Good	40.0	48.5	32.3	40.4‡	53.4	42.7	49.5	49.1‡
Very good/excellent	51.2	39.4	58.1	49.3‡	23.7	26.8	15.4	22.0‡
Weight control								
Not doing anything/ trying to put on weight	86.2	75.8	79.6	80.1‡	47.5	45.1	50.5	47.8‡
Trying to lose weight/ not to put on weight	13.8	24.2	20.4	19.9‡	52.2	54.9	49.5	52.2‡
Weight harmful to health								
Not harmful at all/ not very harmful	97.3	93.9	95.6	95.4‡	53.5**	49.4**	38.2**	47.5‡
Quite harmful/ very harmful	2.7	6.1	4.4	4.6‡	46.5**	50.6**	61.8**	52.5‡
Correct recognition of factual information about health risk from the article	90.0	84.7	80.6	84.9	86.2	84.0	89.0	86.5

**P<0.01, **P< 0.001: Pearson chi-square by condition (within healthy weight or overweight/obese); †P< 0.05, ‡< 0.001: Pearson chi-square by weight status*.

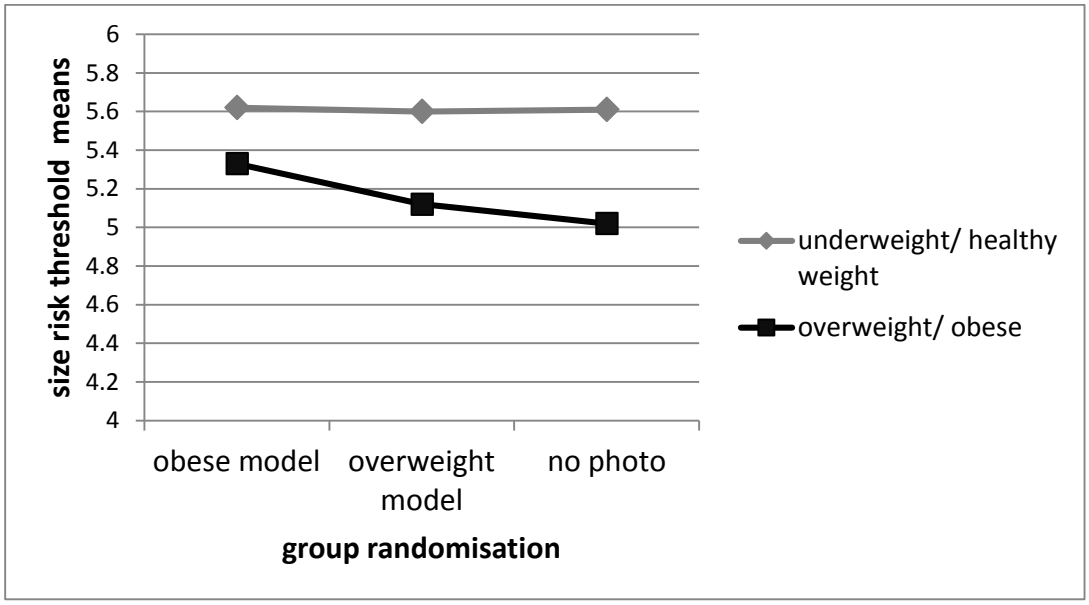
Manipulation check

A manipulation check was conducted to establish whether participants randomised to obese model and overweight model condition rated the size of the models differently (i.e. if they were able to discriminate the size of the model). Participants from the obese model group rated the model as significantly larger than those in the overweight condition (average rating = 7.09 vs. 5.91; $F(1, 369)= 103.06$, $p< .01$) confirming that participants were able to detect a difference between the models.

Hypothesis 1: *The presence of an exaggerated overweight model alongside a factual article about the risks of being overweight will influence what participants perceive a person at risk to look like (i.e. that a higher weight is needed for the negative health consequences of excess weight to occur).*

The main effect of the study condition was non-significant for the sample as a whole, as no difference was found between conditions in estimations of the body size from which the risk of heart disease starts to increase, $F(2, 562)= 2.28$, $p= .10$. Thus, Hypothesis I was not supported. Healthy weight participants estimated the risk of heart disease to be present at a significantly higher body size than overweight participants in all conditions ($F(1,562)= 18.89$, $p<.01$; see Figure 4.1). Among overweight/ obese participants, significant differences emerged between study conditions in estimation of the body size from which the risk of heart disease starts to increase, $F(2, 290)= 4.06$, $p= .02$. *Post hoc* tests indicated that overweight participants viewing a morbidly obese image perceived health risks to start from a significantly higher body weight ($M = 5.33$, $SD = .76$) than those who saw no image ($M = 5.02$, $SD = .80$) (Cohen's d 0.41, 95% CI; 0.31- 0.52). There was no difference between the two image conditions (overweight model- 5.12, $SD = .91$) (see Figure 4.1).

Figure 4.1 Comparison of size risk threshold in each study condition for overweight vs. healthy weight participants



** size risk threshold score range 1-9*

Secondary analyses

Hypothesis 2: *The use of an exaggerated image will undermine autonomous motivation towards weight loss, relative to an accurate image or no image.*

No effect of the study condition on autonomous motivation emerged, $F(2, 563)= .514$, $p= .598$, suggesting that the size of image presented alongside the article did not compromise autonomous motivation for weight control as predicted.

Do demographic characteristics, and weight-related cognitions moderate health message acceptance?

Among 291 overweight/obese individuals who took part in this study, 50.9% (148) felt that the message in the article did not apply to them, while 47.8% (139) felt it is relevant and could apply to them (four participants [1.3%] were excluded from this analysis as they indicated that they did not read the article). A stepwise logistic regression analysis was performed to explore factors associated with personal message acceptance among overweight participants; predictors included six categorical predictors: experimental condition, gender, weight concern (not at all concerned/ not very concerned vs. quite concerned/ very concerned), education (higher degree vs. lower degree), obesity and high blood pressure association awareness and correctly answering the question about the

article; seven continuous variables: perceived weight discrepancy, heart comparative risk, weight concern, weight being harmful to health, BMI, age, autonomous motivation. There was a weak relationship between prediction and grouping (Nagelkerke's $R^2 = .286$); 69.4% were correctly classified with a prediction success of 67.4% for those who would think that the message does not apply to them and 71.5% for those who would think the message would apply to them ($\chi^2 = 67.12$, $p < .01$, $df = 14$). Message acceptance was significantly predicted by: higher autonomous motivation towards weight control, existing awareness of the link between being overweight and high blood pressure, greater proximity of their own weight to the risk threshold, older age and correct factual recognition of the article content (Table 4.2).

Table 4.2 Predictors of Health Message Acceptance among Overweight and Obese Participants

	OR	95% CI
Gender		
Female	1.73	0.89, 3.34
Male	1.00	-
Experimental Condition		
Obese model	1.00	-
Overweight model	0.95	0.48, 1.84
No photo	0.92	0.48, 1.76
Overweight-high blood pressure link awareness		
no	1.00	-
yes	5.82	1.06, 32.07*
Current engagement in weight control		
Not doing anything	1.00	-
Avoiding weight gain/ trying to lose weight	0.98	0.54, 1.77
Education		
Lower degree	1.00	-
Higher degree	0.64	0.35, 1.17
Recognition of the article's main message		
Incorrect answer	1.00	-
Correct answer	2.76	1.17, 6.52*
Perceived weight discrepancy **	0.76	0.58, 0.99*
Weight harmful to health	0.91	0.53, 1.57
Weight concern	1.30	0.76, 2.23
Heart attack comparative risk	1.33	0.86, 2.06
Autonomous motivation	1.08	1.03, 1.13*
Age	1.04	1.01, 1.06*
BMI	0.96	0.91, 1.01

** denotes significant values (P< .05)*
*** calculated as the discrepancy between participant's estimation of their current weight and the weight at which the risk of heart disease starts to increase*

4.4 Discussion

The present study aimed to explore the effect of using images of morbidly obese individuals accompanying texts about being overweight on message comprehension and acceptance. The results indicate that there is no effect on healthy weight people and this group reported a similar body size risk threshold in all study conditions. However, the results indicate that the inclusion of images of morbidly obese adults can undermine risk perceptions in overweight/obese people. The presence of an exaggerated, obese model alongside an article about the risks of being overweight caused overweight and obese people to underestimate the risks of being overweight (i.e. believe risks start from a larger body size) compared with the same message delivered with no photo. The use of images of morbidly obese individuals does not have a negative impact on people's interpretations of health risk. The effects were not brought about by differences in message recognition, which was consistent across all conditions (χ^2=3.86, df= 5, p= .57).

As such these findings might suggest that overweight and obese people use the photo as a 'reference' point to judge who the health message was targeted at (i.e. how overweight a person at risk would look). This explanation is consistent with the results of a review of studies on the use of pictures and its effects on comprehension in children which concluded that readers might use pictures to guess, often incorrectly, the intended meaning of the message (Filippatou & Pumfrey, 1996). This would suggest that the picture was a source of visual anchoring bias (Bogardus Jr, Holmboe, & Jekel, 1999), where participants used the photo to make subsequent judgments (i.e. answer the question about the risk threshold). Although the photo used appeared to frame understanding of the article in visual terms as responses on the visual scale differed across conditions, it did not appear to affect responses in the recognition question (*According to the article, how much more likely to develop heart disease are people who are overweight?).* This might suggest that the use of a visual scale allowed better evaluation of the message comprehension and to capture differences in people's understanding of the message (i.e. at what body size the risk would start) in contrast to simple recognition where people can often remember information without understanding it (Houts, Doak, Doak, & Loscalzo, 2006).

While responses of overweight and obese participants seemed to be affected by the study condition, healthy weight participants rated the risk at which heart disease starts to increase similarly across conditions, however felt that higher weight is needed for the negative effects of obesity to occur compared with overweight and obese individuals. This might suggest that healthy weight individuals distance themselves more from the health message as they perceive the health risks at a higher body weight independently from the pictures compared

with the overweight and obese participants. It is possible that responses of healthy weight participants did not differ between conditions as irrespective of the picture they felt the message was not relevant (only 11% of healthy weight participants felt the message could apply to them).

This study not only measured message comprehension but also message acceptance, as little is known about the reception of anti-obesity messages among overweight and obese individuals, and in particular whether they apply such information to themselves (Puhl et al., 2012). Results demonstrated that approximately half of the overweight and obese participants felt the message was not personally relevant to them, although the majority were aware of their weight status and could correctly recognise the article content. Experimental condition (i.e. type of the photo or lack of the photo) was not a significant predictor of personal message acceptance. Therefore the hypothesis generated in Study 1 suggesting that the use of obese models would prevent identification with the message was not supported. The results of the current study are also not in line with the results of a qualitative study exploring the impact of public health messages about obesity among obese adults (Lewis et al., 2010). Participants felt they could not relate to the behaviours of people depicted in these campaigns as images used involved morbidly obese individuals presented in a stereotypical way. However, in Lewis et al.'s study, interviews were conducted by telephone therefore participants were not shown images used in public health campaigns, but asked about their views on public health messages that were around at the time of the interview. Participants associated obesity campaigns with images of very obese adults indulging themselves in unhealthy food products, while in contrast in the current study images of adults were shown walking which represents a less biased representation of adults who are obese (Heuer et al., 2011).

Five variables emerged as significant predictors of message acceptance, namely: higher autonomous motivation for weight control, older age, smaller difference between self-perceived weight and perceived weight needed for the negative health consequences to occur, correctly recognising the article's main message and being aware of the link between being overweight and increased blood pressure. These results suggest that regardless of image size, media coverage of weight and health risk information resonates more with people who are already aware of their health risks and ready to take control of their weight as message acceptance was predicted by existing awareness of weight-related health risks and motivation for weight control activities. These findings could be explained by the SDT premises according to which people who are autonomously motivated to control their weight would be more likely to attend to the message and would be less likely to be reliant on

external prompts (i.e. photo type) to sustain their decision of the need to control/ lose weight, therefore no effect of the photo type was observed. There is some support for this notion as analyses demonstrated that the use of exaggerated images does not undermine motivation towards weight control. This finding suggests that the photo type has not undermined people's rationale for weight control as those who were autonomously motivated towards weight control have internalized (integrated) the rationale, which means they have endorsed a value for behavioural control and their behaviour is autonomously regulated (i.e. positive adoption of autonomous motives is not affected by the photo type).

Findings from the current study also suggest that for the message acceptance, individuals not only need to be aware of their weight status (whether they are overweight or obese), but also need to perceive that the risk of heart disease starts at a relatively low weight (overweight rather than morbidly obese). These findings would have important implications as it appears that the images accompanying the health information used in the present study framed the message understanding (how overweight a person has to be for the risk to occur). Therefore, even if individuals had an accurate awareness of their own weight which has been associated in previous studies with self-care behaviours such as attempting to lose weight (Jones, Grilo, Masheb, & White, 2009; Edwards, Perringell, & Borowsky, 2010; Skinner, Weinberger, Mulvaney, Schlundt, & Rothman, 2008), if they were presented with an image of someone morbidly obese, they might be less likely to accept the message.

4.4.1 Policy implications resulting from this empirical study

Information campaigns focussed on the thresholds of excess weight incurring health impact

Individuals in the current study who perceived a smaller discrepancy between their current weight status and the degree of overweight needed for the negative health consequences of obesity to occur, were more likely to personalize the health threats posed by excess weight. This suggests that obesity policies that help individuals to recognise their own weight status at the same time as communicating the message at what weight status the negative effects of excess weight occur, could be effective. Past research suggests that information campaigns have the greatest potential to achieve this policy aim (Alley & Chang, 2007; Flegal, Graubard, Williamson, & Gail, 2005; Felgal, Kit, Orpana, & Graubard, 2013). For example, an Australian campaign *Measure up* was successful in terms of communicating at what waist circumference negative health effects start (at overweight rather than obese) through a nation-wide mass-media campaign including television, radio

and press. Media communication included a television commercial showing a man walking alongside an oversized tape measure and as this man approaches a camera, his weight progressively increases. As a result, knowledge regarding waist circumference increased from 0% to 32% in men, and from 6% to 40% in women, suggesting that such an approach might be effective in increasing awareness of the link between waist circumference and chronic disease risk (The Social Research Centre, 2010).

Evaluate visual images used in the campaigns and use visual images for evaluation

In the current study, the use of images appeared to affect message comprehension in terms of what participants thought a person at risk would look like as evidenced by the size of the figure selected on the visual scale. Evidence from past work also suggests the inclusion of images in public health campaigns might affect message comprehension, as recipients of such visual messages are likely to focus on characteristics other than weight (e.g. whether a pictured person is eating junk food) (DH, 2008b; Lewis et al., 2010). It is not fully understood what effect such images exert, however the current study provides some preliminary suggestions that such images change a viewer's focus. Therefore campaigns should specifically evaluate the inclusion of visual images and their impact on how the message is received and responded to.

A further challenge to evaluating health information campaigns, is investigating whether the materials improve understanding rather than more abstract knowledge. In the current study the use of a visual scale depicting figures of increasing body size helped to evaluate how participants interpreted at what body size health risks would start. This method improved on techniques used in previous health promotion campaigns, as it required participants to apply what they had understood, and did not rely on the recall of numbers. For example, while the Australian *Measure up* campaign was successful in increasing population awareness at what waist circumference health risks start (The Social Research Centre, 2010), it is not known whether respondents understood the message and could translate it to consider their own or others' degree of risk, or were simply able to recall the values presented in the information provided. The use of visual aids (e.g. silhouettes) would therefore be a useful tool to help evaluate the impact of information campaigns.

4.4.2 Study limitations

The study sample was not representative of the UK population, thus results cannot be generalised; the sample was largely well-educated and represented only a small geographical area. Participants took part in the survey voluntarily, thus they might be more

interested in health or concerned about their weight than average people. The recruitment of the obese male model was unsuccessful and an image available on the internet was used, while the BMI of this model was estimated. Measure of message acceptance was constructed for this study and no psychometric validity was established, however it was based on a widely used staging algorithm. Also message acceptance was measured by one questions only and it is possible that a question phrased in a different way (e.g. asking participants whether they could be at risk of) could have evoked different answers. The study did not include before and after measures; however, the usefulness of measuring study variables at two time points emerged during data analysis, not when planning the study. Measuring constructs at one time point was sufficient to explore the study's aims and hypotheses. The study was not longitudinal therefore any causal relationships could not be established.

4.4.3 Future research directions

Literature on message acceptance is scarce and while this study sheds some light on factors that might affect perceiving the message as personally relevant, a number of important questions remain unanswered. Future research could explore the mechanism underpinning other findings reported here: that is, to investigate why despite no difference in message recognition or perceptions of personal relevance of the health message, the presence of an exaggerated obese model caused overweight and obese people to downgrade their perceptions of the onset of health risk. It would be useful to further explore the reasons for this tendency among overweight and obese participants to distance themselves from the content of the message. This is important as a large part of obesity policy is focused on information and health promotion initiatives and engagement with the message is crucial for their effectiveness. Overweight people may perceive the message as threatening and as a result may be less able to focus on objective judgment criteria. This in turn might lead to psychological reactance (e.g. denial, anger) (Rains, 2013), or attempts to dissociate themselves from the stigma associated with being overweight (Heuer et al., 2011; McClure et al., 2011; Puhl, Peterson, et al., 2013). Another question arises as to the importance of accepting the message as personally relevant and taking action on it. If researchers are successful at determining factors that prevent people from perceiving the message as personally relevant and successfully address these factors such that a majority of people accept the message, how much more likely would people be to act on it? This would have important implications for obesity policies that people decide to engage with as implementation of policies that are perceived as personally relevant for many people might increase active engagement.

4.4.4 Conclusions

This study has explored whether the use of images of morbidly obese models accompanying health messages about being overweight can influence people's interpretation of written text. Results showed that although there was no overall effect of different images on message comprehension, the use of morbidly obese models can cause overweight people to visually underestimate the level of obesity associated with health risks. However, it does not seem to influence the degree to which they perceive the message as personally relevant. Factors predicting whether people feel a health message applies to them personally suggested that health risk information might resonate more with people who are already aware of their health risks and are motivated to take control of their weight. This might suggest that people who are motivated to control their weight are more likely to accept the message, rather than the message motivating people to take action (i.e. motivation might be a prerequisite for message acceptance). Therefore, the results of this study did not confirm the hypothesis generated during Study 1 that the use of morbidly obese models might prevent identification with the message.

CHAPTER 5: Juicy June: Piloting a month-long snack-swapping intervention to promote a healthy diet.

5.1 Introduction

Study 1 (Phase 1 and 2) highlighted several ways in which participants felt the social environment influenced their motivation to quit smoking or control their weight. In both studies, participants felt that the perception of a given behaviour being socially acceptable and normal affected their subsequent behaviour and behaviour of their close networks (i.e. family and friends). In the case of smoking, where not-smoking was perceived as the norm, participants felt their close networks provided them with support for not-smoking. In the obesity area in contrast, where eating an unhealthy diet and leading a sedentary lifestyle was perceived as normal, family and friends were often undermining participants' diet attempts. Participants also felt that low self-efficacy and low motivation for behaviour change affected their subsequent eating behaviour. Although participants were aware of the negative consequences of their current behaviour and benefits of changing it, they felt unable to initiate action and did not believe in their ability to produce a desired effect.

From a SDT perspective, it appears that the current social environment is not perceived as being autonomy supportive, that is, it does not facilitate the process of internalization of weight control (Deci & Ryan, 2000). An important condition that promotes the creation of an autonomy supportive climate is having a meaningful rationale for changing the behaviour (e.g. why an overweight person would benefit from regular exercise). Despite being aware of the rationale for change that society or the health service is proposing (i.e. to improve health outcomes), and agreeing that health is important and should appeal to them, participants in Study 1 did not find the rationale sufficiently meaningful or powerful to promote internalization. They appeared to introject the rationale, but did not accept it as their own (i.e. felt they *should* quit smoking or lose weight as they were told so by their doctor). Participants of Phase 2 also perceived the social environment as undermining their healthy eating attempts. While participants made a decision to change their eating habits, their friends and family were undermining their attempts and encouraging them to have unhealthy treats together. Therefore participants decided to enjoy food with friends and experienced belonging and closeness, despite their sense of volition being undermined (need for autonomy was thwarted). It appears that the social world has placed the need for autonomy and need for relatedness against each other.

Past work has shown that experiencing the social environment as autonomy supportive as opposed to perceiving it as controlling, can have important positive implications for health behaviours as it would support the integration of a behaviour regulatory process. These predictions have been confirmed by research in the health context (Williams & Deci, 1996; Williams et al., 1996; Williams, Rodin, Ryan, Grolnick, & Deci, 1998), physical activity (Gillison et al., 2011; Pelletier et al., 2001) and education (Cordova & Lepper, 1996; Gottfried et al., 1994; Vallerand et al., 1997). A number of interventions have been designed in the weight loss area that successfully created an autonomy supportive climate and brought about positive changes in treatment settings (see Chapter 2, Section 2.6.6 for more details); however, these have been addressed at a situational level which refers to the here and now of motivation. According to Vallerand's HMIEM (Vallerand, 2000; Vallerand & Ratelle, 2002) societal and environmental factors operate at three different levels (situational, contextual and global) affecting outcomes of motivational orientations. Obesity treatment works at a situational level, however the undermining of autonomy support discussed by study participants takes place at a contextual level (life domain level); thus participants appeared to experience a top down effect of contextual level motivation, undermining motivation at the situational level. Given that Studies 1 Phase 2 indicate that people experience a lack of support for autonomy in relation to weight management behaviours possibly due to basic need frustration at a more societal level, the present study aimed to apply SDT at this broader level (i.e. situational level), to attempt to foster a more autonomy supportive social climate.

Campaign-based health promotion interventions

One way that health promotion activities have attempted to generate support at societal level is through the creation of a 'mass quit attempt effect' (e.g. Stoptober, Fox & Hampton, 2013) or introducing a campaign where people pledge to stop drinking alcohol for a specific period of time, usually a month (e.g. Febfast, Dry January, Ocsober). These types of campaigns have been successful in producing sustained behaviour changes; for example, among participants who completed Febfast 51.3% had more alcohol free days, 49.1% reported drinking less and of those (reporting either changes in frequency or amount of drinking) one third maintained the changes for a year (Victorian Health Promotion Foundation, 2012). Although there is evidence that such campaigns can be effective (Victorian Health Promotion Foundation, 2012; Brown et al., 2014), these campaigns lack a process evaluation that would allow an understanding of the mechanism of how they work. As such, there is potential they could be enhanced by the addition of relevant theoretically-based components.

The current study will aim to explore the mechanism of action of a similar campaign from an SDT perspective. It will be explored whether a campaign can be successful in creating an autonomy supportive climate by the presence of interpersonal conditions such as providing a meaningful rationale for people to engage in such a campaign (e.g. improve health), providing structure or offering an optimal challenge. As a result of the successful creation of an autonomy supportive climate participants might internalise the value or regulatory process as their own. In addition, such a campaign might be successful in addressing social pressure to engage in unhealthy behaviour at a contextual level by setting the context of being in a challenge where one eats a healthy diet, which in turn might help participants cope with situational level influences (e.g. lack of social support for healthy eating on a day to day basis).

As such campaigns have been a-theoretical it is not known how they achieved the change (what constructs have been targeted), or what tools/ techniques for the behaviour change were used. The majority of these interventions were delivered via social media, in particular over the internet and employed the use of Facebook, an online social networking site; yet, it is likely that at the same time participants could have been supported by their close networks. While research evidence supports the important role of social support for behaviour change (Greaves et al., 2011), little is known about the use of social media as a source of social support. Social media available online are a recent phenomenon (e.g. Facebook became available for the public in 2006); however, its popularity has been increasing rapidly in the recent years (Bonds-Raacke & Raacke, 2010) with 36 million users in the UK in 2013 (72.57% of internet users) (Fanalyzer, 2013). It is possible that social support for behaviour change can be provided via Facebook by the creation of Facebook groups based on a common interest. These groups can be accessed 24 hours a day, where members of a given group can communicate by posting messages on a 'wall' (a public messaging board) and by leaving comments to other individual's posts or 'liking' other posts.

While studies have demonstrated Facebook's efficacy as a mode of health intervention delivery (Bull, Levine, Black, Schmiege, & Santelli, 2012; Mayer & Harrison, 2012; Napolitano, Hayes, Bennett, Ives, & Foster, 2013), only one study has examined the use of Facebook as a source of social support (Cavallo et al., 2012). 134 students were randomised to use a physical-activity focused website (education-only control group) or the same website plus online self-monitoring tool plus enrolment in a Facebook group where participants were encouraged to solicit and provide social support. At the end of the intervention there were no differences between groups in perceived social support or physical activity (both groups improved on both measures) and among the intervention

group, frequency of contribution to Facebook did not have any effect on these variables (perceived social support and physical activity). Participants randomised to the intervention group were satisfied with the use of Facebook and suggested that it could be improved by a greater level of interaction between the group moderator (intervention leader) and include more tips and advice regarding physical activity. However, there were some potential confounding factors of the intervention, as participants using the Facebook community were offered incentives for contributing to the community and the study design did not allow the examination of the separate effects of participating in the Facebook community from self-monitoring.

Current intervention

Rationale for conducting a pilot study

It is premature to recommend that an intervention that appears to be effective in tobacco and alcohol context, shall be administered in the food area as this would simply imitate apparently successful approaches; therefore, a preliminary assessment through a pilot work will be conducted as recommended by the Medical Research Council (Craig et al., 2013) to establish whether the intervention works in the ways predicted. Pilot studies are important as they help to determine whether all the components of the main study can work together (Ven Teilingen & Hundley, 2002) and large studies often have a number of pilots targeting key uncertainties to increase the success of the main study (Craig et al., 2013). The current pilot work will focus on establishing whether this approach has the potential to change people's diets.

Current study would represent an obesity preventive initiative rather than an intervention targeting specifically overweight people. As argued in the previous chapter, obesity policies should involve obesity treatment and obesity prevention with the more focus on the latter as evidence suggests that once individual becomes overweight the effectiveness of treatment apart from bariatric surgery is limited (Avenell et al., 2004; Franz et al., 2007) and sustained behaviour change in obese people is difficult to sustain, even when intensive psychological treatment to aid weight management is provided (Cooper et al., 2010). In addition, it is predicted that in the UK by 2050, the proportion of men within healthy weight will decline from 35% to less than 10% and among women from 41% to approximately 15% (Foresight, 2007), therefore focus on obesity prevention is important. A significant part of obesity prevention are health promotion initiatives and these include healthy eating campaigns which aim to promote healthy lifestyles. In the current pilot study participants will be asked to replace an unhealthy snack with a healthier one including fruit or vegetables. Research evidence suggests that by the introduction of small dietary changes and reducing

energy balance by 50 kcal/day weight gain could be prevented in approximately 90% of the population (Hill et al., 2003). Hence, participants will be asked to make small dietary changes in eating habits (e.g. a simple swap of a biscuit, e.g. two Jaffa cakes equals 90 kcal for a small apple- 45 kcal).

The current pilot study will also draw on the evidence regarding message communication as the way a campaign message is conveyed might affect how individuals would respond to it. A recent experimental investigation of obesity-related health messages including messages from the US, UK and Australia, concluded that messages promoting a healthy lifestyle and not referring to obesity/weight were perceived as most positive and motivating, while those addressing weight and stigmatising obesity as least motivating. Participants reported stronger intentions to comply with the content of health messages when the messages were promoting fruit and vegetable consumption, focusing on multiple behaviours and those attempting to boost participants' confidence and instil strength to take control of their health, while those blaming individuals for their weight received a less positive rating (Puhl, Peterson, & Luedicke, 2012). There is also evidence from social marketing campaigns suggesting that initiatives explicitly targeting weight loss achieved poorer weight loss outcomes compared with campaigns emphasising the importance of healthy eating and physical activity (Lang & Rayner, 2007; Veerman, Barendregt, van Beeck, Seidell, & Mackenbach, 2007). Therefore it is argued that obesity interventions should focus on the benefits of a healthy diet and increased physical activity rather than on obesity per se.

The current intervention will be drawing on techniques that promote need support from the SDT literature (Deci et al., 1994) to create an autonomy supportive climate. Research has shown that integrating SDT with techniques from different theories can further assist in promoting internalization of the behaviour (Fenner, Straker, Davis, & Hagger, 2013; Patrick & Williams, 2012). The behaviour change techniques chosen were specifically mapped to determinants of dietary behaviour targeted, as identified by prior studies conducted as a part of this thesis and literature review. Evaluation of this intervention will use both process and outcome evaluation in line with current guidelines on developing and evaluating interventions (Craig et al., 2013). Process evaluations can help answer the questions as to how intervention works (what are the active ingredients and what is the mechanism of their action?). Information gained during process evaluation might also help to explain success, failure or unexpected findings of an intervention (Armstrong et al., 2008). Although a rigorous process evaluation should encompass five dimensions: fidelity (the extent to which intervention was delivered as planned), dose (how much of the intended intervention is

delivered), reach (how many intended recipients took part in the intervention), recruitment and context (Linnan & Steckler, 2002; Saunders, Evans, & Joshi, 2005) (for more details see Appendix 5.1), the process evaluation used in this study will focus on examining process level factors to determine whether the intervention worked according to the specified hypothetical model. Qualitative research looking at the experience of individuals is also an important part of the process evaluation (NICE, 2007); therefore, process evaluation will also include a discussion group with intervention participants.

This intervention will be delivered to the general public rather than targeting those who are overweight, therefore universal recruitment approach which is open to all will be used. The current study translates the evidence from smoking and alcohol reduction campaigns, which use universal recruitment approaches rather than targeting heavy smokers or heavy drinkers, as it is believed such recruitment will enable the creation of mass- participation event. For example, such open approach to recruitment was effective in Febfast where although it resulted in a sample that was more educated, with higher income, more likely to include females, participants were consuming alcohol more often and in greater amounts compared with the Australian drinkers sample (reflecting current Australian population) (FebFast, 2011). For example, 31.8% participants of Febfast reported binge drinking at least once a week, while it was reported by 17.2% of the Australian drinkers. These results suggest that an approach using universal recruitment was able to result in at risk sample. In the current study, it is anticipated that an approach targeting all adults will results in a sample including both healthy and unhealthy eaters who would benefit from taking part in such a campaign.

This pilot work will use a pre-test/post-test observational (non-experimental) design. This approach aims to mimic the approaches used in mass-change campaigns in tobacco and alcohol areas, and allowing the observation of who the approach appeals to (people with what characteristics would register to take part). This would allow us to establish whether and how such approach has the potential to be useful as a public health intervention. If, for example, recruitment results in a sample of healthy weight, healthy eating individuals, this would suggest such approach might be more acceptable as a preventive approach, rather than weight management tool for those already overweight. In addition, the use of an observational study appears suitable as one of the main outcomes of the current study is to observe the mechanisms of effect, and that this can be established without the need for a control group as is only relevant for those who take part (a full RCT could be run after this has been established).

5.1.1 Study aims and objectives

Research question

The primary research question was whether a month-long campaign encouraging people to swap an unhealthy snack for a portion of fruit or vegetables, thus translating a type of intervention that has proven effective in smoking and alcohol reduction to improving diet, can be successful

Study aims

To investigate whether current intervention has the potential to change people's diets and whether the changes are sufficient to bringing about a change in weight.

The objectives of the intervention were:

1. To test a theory-based intervention targeting two factors: (i) social undermining of attempts to eat a healthy diet and (ii) motivation for dietary change.
2. Test a model of hypothesised intervention effects examining the outcomes of motivation and social support at the contextual level (the proposed model that specifies the expected mechanism of the intervention is presented in Figure 5.1)
3. Test six hypotheses:
    1) *Hypothesis 1*: The intervention will result in an increase in fruit and vegetable consumption, and a decrease in snack consumption.
    2) *Hypothesis 2*: The intervention will result in increased social support.
    3) *Hypothesis 3*: The intervention will result in increased autonomous motivation.
    4) *Hypothesis 4*: Increases in autonomous motivation and perceived social support will be positively associated with dietary changes.
    5) *Hypothesis 5*: Autonomous motivation will be facilitated through promoting need satisfaction and guarding against need frustration. Further, autonomous motivation will mediate the relationship between basic need satisfaction and dietary changes.
    6) *Hypothesis 6*: Habit strength will have an additional independent effect on increased fruit or vegetable consumption in addition to motivation and social support.

4. Conduct a focus group with participants of the intervention to voice the experiences and opinions regarding the intervention.

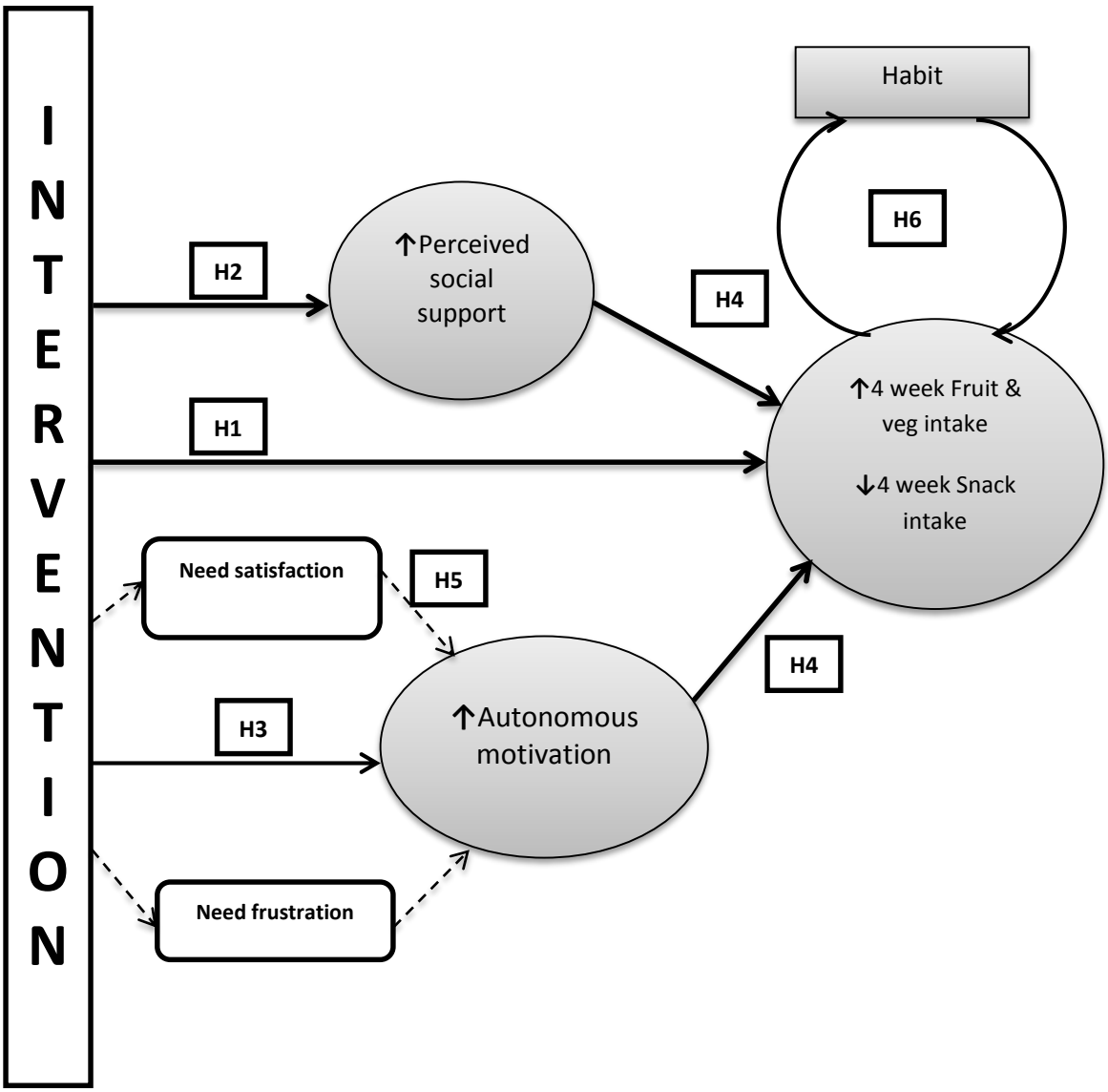
Primary Outcomes:

- short-term (4-week) effects changes in fruit/ vegetable intake
- short-term changes in snack intake.

Secondary Outcomes:

- changes in the constructs believed to mediate intervention effects/ mechanism (social support for healthy eating, intrinsic motivation etc.).

Figure 5.1 Logic model that specifies the expected mechanism of the intervention



5.2 Methods

5.2.1 Intervention design

Juicy June was delivered as a month-long campaign-style intervention. Participants were asked to replace an unhealthy eating habit with a healthier one including fruit or vegetables. The intervention was delivered online, lasted 4 weeks and was assessed at the end of the intervention (4 week evaluation) and 8 week follow up. Participants were able to register for the study by filling in the baseline questionnaire that was available online. The first page of

the questionnaire contained a Participant Information Sheet providing detailed information about the study. At this stage participants also consented to taking part. A baseline questionnaire asked participants about their perceived health status, daily diet, perceived social support for healthy eating and motivation for weight control. Personalised dietary feedback on daily intake of fruit and vegetables, fat and fibre based on the information participants provided was emailed to them. *Informational feedback* was presented on a graph where the background of the graph presented government guidelines on the intake of these three nutrients using traffic light colour coding. The feedback also provided general information about the likely consequences of having a diet low/high in fruit/vegetable, fibre and fat (*provide information on consequences of behaviour in general)* (Appendix 5.3 an example of dietary feedback). Participants were then asked to select an unhealthy eating behaviour and a healthier eating behaviour they will replace it with (*providing choice, delegating responsibility, goal setting/ set challenging tasks*). They were asked to continue with the behaviour replacement for 30 days (*provision of structure*) and monitor their progress using a feedback form of their choice (e.g. Juicy June calendar; *prompt self-monitoring of behaviour*) (Appendix 5.4- Juicy June calendar). Participants were encouraged to join the online Juicy June community created on Facebook (*provide social support;* see Appendix 5.5 for Facebook updates).

On 30th May 2013 (two days before the Juicy June launch) participants were sent final instructions that aimed to remind them steps involved in Juicy June (*use of non-controlling language*) (Appendix 5.6). They were asked to make specific plans regarding where, how and when they will perform the new behaviour (*implementation intentions*) (Verplanken & Faes, 1999). They were also asked to think about possible barriers they might encounter when trying to change the behaviour and ways of overcoming them (*barrier identification/ problem solving*). During intervention participants were encouraged to seek and elicit social support via Facebook (*encourage social support seeking*). Facebook updates provided by the researcher contained neutral information about healthy eating (*provide information*) and some posts aimed to provide encouragement (*provide general encouragement*). At the end of each week participants were sent an online questionnaire assessing their progress against Juicy June targets in the past week (they were sent four weekly evaluations in total).

On 1st of July, participants received an email congratulating them on completing Juicy June and asking them to fill in the 4-week evaluation which was available online. The evaluation consisted of questions on participants' experience of Juicy June, their diet, perceived social support for healthy eating, motivation towards weight control and basic needs satisfaction

and frustration. Those who completed final evaluation received a personalised dietary feedback comparing their baseline diet assessment and 4-week evaluation assessment (*provide feedback on performance*) (Appendix 5.7). One month following the end of the intervention, participants were emailed a questionnaire assessing continued intervention outcomes (8-week evaluation). This questionnaire included questions on participants' diet, motivation towards weight control, habit formation and self-efficacy. All behaviour change techniques employed in the current study are presented in Appendix 5.2.

5.2.2 Sample size calculation

This study was a pilot study where a primary outcome was dietary change, therefore one of the criteria for success of this pilot study is whether a significant change in fruit and vegetable intake would be achieved. Sample size calculation to detect a medium size intervention effect (Cohen's d 0.5) on change in fruit and vegetable consumption used GPower software. Calculations indicated a sample size of 40 participants would be necessary; however attrition rates (dropouts and losses at follow-up) are high for interventions delivered on-line (Bennett & Glasgow, 2009); therefore to account for potential attrition, an initial sample of 80 was recruited.

Partial eta squared is not suitable to be used as a measure of effect size for this study as the sample size was small and this estimate of effect size will overestimate the size of the effect in the population (Fritz, Morris, & Richler, 2012). The use of generalised eta squared is recommended for repeated measure designs as it provides comparability across between-subjects and within-subject designs (Bakeman, 2005; Olejnik & Algina, 2003); however, it is a simple statistic and may overestimate population effect sizes in small samples (Morris & Frtiz, 2013). Therefore Cohen's d will be used as it is a robust and widely used measure and might be useful for comparisons between means for repeated measure designs with more than two time points (Morris & Frtiz, 2013). As recommended by Fritz et al. (2012) complete effect size information with confidence intervals will be reported.

5.2.3 Recruitment

Participants were recruited via adverts placed on the University of Bath noticeboard, local press release, adverts on Facebook and via Twitter. Potential participants were informed about the study purpose, what it involved, what support they would be offered and how they could register. The inclusion criterion was age over 18 years of age.

Test of materials and processes

Six participants took part in the Juicy June pre-pilot, where participants followed the Juicy June protocol for one week. At the end of the week period, they attended a discussion group where they shared their experience of taking part in the study and suggested changes and improvements to Juicy June. They reported that Juicy June was acceptable and feasible. One change to the project was implemented as a result of feedback from the pilot. According to the initial study protocol, participants were to receive daily text messages to remind them about their swaps. However participants who pre-piloted Juicy June perceived a daily text message as too intrusive, therefore it was decided that participants will be offered a choice (a number of options regarding reminders they want to use).

5.2.4 Measures

The study was assessed at three different time points: baseline assessment, 4-week evaluation (post intervention evaluation) and 8 week evaluation (8 week outcomes). In addition, at the end of each week participants were asked to provide feedback on their progress by completing a short online questionnaire (adherence).

Table 5.1 Measures used in the study during three assessments.

Baseline assessment	4-week evaluation (post-intervention evaluation)	8-week evaluation
Demographic characteristics		
Perceived health status		
Social support for healthy eating	Social support for healthy eating	
Diet assessment and snack intake assessment	Diet assessment and snack intake assessment	Diet assessment and snack intake assessment
Motivation for healthy eating	Motivation for healthy eating	Motivation for healthy eating
	Habit measure	Habit measure
	Reasons for participation in Juicy June & experience of participation	
	Basic need satisfaction and support	
	Intentions to continue with Juicy June swap	
	Adherence	
		Juicy June and self-efficacy

Demographic characteristics Demographic variables assessed included: gender, age, weight, height, ethnic group, employment status, highest level of education obtained. Participants' BMI was calculated as self-reported weight (kg)/ height^2 (m) and participants were classed as underweight (BMI <18.5), healthy weight (BMI between 18.5 and 24.9), overweight (BMI 25-29.9) and obese (BMI≥30) in line with standard medical criteria (WHO, 2013a).

Perceived health status Participants' smoking status was assessed by asking whether they are current smokers, ex-smokers or never smoked. Perceived health was assessed by one question: *In general, would you say your health is: poor, fair, good, very good or excellent*. Perceived weight was measured by one question: *How would you describe your current weight?* (*very underweight, somewhat underweight, about right, somewhat overweight or very overweight)* (Wardle & Johnson, 2002). Perceived body size was assessed using a 9-figure gender specific silhouette visual scale taken from Weight and Lifestyle Inventory (Wadden & Foster, 2006), a scale developed for the assessment of patients undergoing bariatric surgery, which shows appropriate discriminant validity

(Wadden et al., 2006). Weight concern, perception of weight being harmful to health and current weight control activity, was assessed by three questions developed to be used in a survey measuring weight concern among Australian adults: '*How concerned are you about your weight?' (not at all concerned/ not very concerned/ quite concerned/ very concerned*) and '*Do you consider your weight as harmful to your health? (not at all harmful, not very harmful, quite harmful, very harmful*); *Which category best describes you? (not doing anything in particular for my weight/ actively doing things to try to gain weight/ actively doing things to try to lose weight/ actively doing things to try to avoid gaining weight*). These questions were piloted for clarity and comprehensibility with a sample of 15 adults (Timperio et al., 2000).

Diet assessment and snack intake assessment Fruit and vegetable intake was assessed by a question adapted from the FACET (Five-a-day Community Evaluation Tool) questionnaire (National Obesity Observatory, 2010c). Participants were asked to indicate if in the last 24 hours they had any of the following ten types of fruit or vegetable: fruit for breakfast; fruit or vegetable as a between meal snack; a glass of pure, unsweetened fruit juice (not squashes or fruit drink); fruit as a starter to a meal; a baked potato; a bowlful of home-made style vegetable soup; portions of vegetables with main meals; a vegetable-based meal; a bowlful of salad; fruit as a dessert. FACET showed a good correlation with food diaries and is able to rank respondents according to their fruit and vegetable consumption (Ashfield-Watt, Welch, Godward, & Bingham, 2007).

Fibre and fat intake were assessed using the DINE (Dietary Intervention in Primary Care) questionnaire (National Obesity Observatory, 2010c). Participants were asked questions about six types of food categories they usually eat (bread; breakfast cereal; vegetable/fruit; foods high in fat such as cheese; type of milk; type of spread). The accuracy of DINE in classifying patients attending primary care according to their fat and fibre intake was undertaken, showing good validity (good correlation with a validated four-day food diary) (Roe, Strong, Whiteside, Neil, & Mant, 1994). The use of this measure has been recommended for use in weight management interventions by the National Obesity Observatory (National Obesity Observatory, 2011a).

Snack intake was measured using the Beverage and Snack Questionnaire (Neuhouser, Lilley, Lund, & Johnson, 2009). The questionnaire was adapted to suit a UK audience and included items on snacks only. Participants were asked to rate how often in the past 7 days they had snacks from 11 snack groups (crisps and popcorns; salty snacks; sweets and gums; chocolate; biscuits and cookies; bakery products; cakes; chilled desserts; ice cream

and milkshakes; nuts and dried fruits; cereal bars). Validation of this measure showed good test-retest reliability and good validity when compared with snack records (Neuhouser et al., 2009).

Social support for healthy eating. This was assessed using an adapted version of the scale developed to measure social support for diet and exercise behaviours. Participants were asked to rate perceived support for eating a healthy diet from their family, friends, acquaintances, or co-workers on an 8-item scale (*none/ rarely/ a few times/ often/ very often/ does not apply*). An example item was: *Eat unhealthy foods in front of you.* The scale has acceptable test-retest correlations of the factors and good internal consistency (Sallis, Grossman, Pinski, Patterson, & Nader, 1987).

Motivation for healthy eating. Motivation to eat a healthy diet was assessed using the Treatment Self-Regulation Questionnaire (TSRQ) (Levesque et al., 2007) adapted to ask about healthy eating. This questionnaire asks about the reasons why people would engage in healthy eating and assesses to what degree people's reasons for engaging in healthy eating are relatively autonomous (self-determined). The scale consists of 16 items, scored on a 7 point Likert scale from 1 '*not at all'* to 7 '*very true'* measuring three motivational domains: autonomous motivation (6 questions, e.g. *Because I feel that I want to take responsibility for my own health*), controlled motivation (6 questions, e.g. *Because others would be upset with me if I did not*) and amotivation (4 questions, e.g. *I really don't think about it*). The scores on each motivational dimension are averaged to form the reflection of a given regulation type on a scale from 1 to 7 (e.g. a score of 6 on autonomous motivation would mean self-determined motives for healthy eating). This scale was found to have adequate reliability in previous studies (Cronbach's α ranging from .58 to .93) (Levesque et al., 2007; Williams et al., 1996).

Habit Habit formation was measured by a 4-item Self-Report Behavioural Automaticity Index measuring automaticity of the behaviour (Gardner, Abraham, Lally, & de Bruijn, 2012). An example item includes: *Eating my Juicy June foods is something I do automatically,* assessed on a 5 point Likert scale from strongly disagree to strongly agree. This measure showed very good reliability in the development paper.

Adherence At the end of each week, participants were sent a short online survey that aimed to measure adherence to the food swapping goals. Intake of unhealthy snacks was measured by one question: *How many times in the past week did you have your usual snack (food that you're trying to avoid during Juicy June)?* assessed on a scale ranging

from none to 8 or more. Juicy June food intake was measured by one item: *How many times in the past week did you have your Juicy June food?* (response range none to 8 or more).

Reasons for participating in Juicy June and experience of participation. Reasons for participating in Juicy June and experience of participation were assessed by nine questions adapted from the evaluation of the Febfast (Victorian Health Promotion Foundation, 2012). The reason was assessed by one statement: *Why did you participate in Juicy June?* (*as a personal challenge/ to increase the number of portions of fruit or vegetables that I eat/ to help me improve my eating habits/ to lose weight/ to be a role model to others/ to participate with friends/ to participate with work colleagues/ to participate with partners/ to cut back on unhealthy food that I eat/ participate with or challenged by someone else/ other*). Seven questions were used to capture participants' experience of participation in Juicy June assessed on a five point scale ranging from strongly disagree to strongly agree. An example item included: *During Juicy June, I had more conversations about healthy eating (e.g. eating more fruit or vegetables) with friends and family than I normally would*. Finally, participants were asked a question: *How easy/difficult did you find swapping one unhealthy habit within your diet for one healthy alternative for a month? (very easy/ easy/ neither easy nor difficult/ difficult/ very difficult*)

Basic need satisfaction and frustration*.* Basic need satisfaction and frustration was assessed by 22 questions combined from two measures: diet-specific need frustration (Verstuyf, Vansteenkiste, & Soenens, 2012) and Work-related Basic Needs Satisfaction Scale (Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010) and adapted to refer to Juicy June. Diet-specific need frustration is a 6 item measure of need frustration and has good internal reliability (Cronbach's alpha = 0.86). Work-related Basic Needs Satisfaction Scale is composed of 18 items and has good internal reliability (Cronbach's α for autonomy subscale= 0.81, competence= 0.85, relatedness = 0.82). Two items were not included as they could not be adapted to the Juicy June context (*Some people I work with are close friends of mine; I often feel alone when I am with my colleagues*). So in total there were 22 items: 6 items measuring relatedness (2 measuring relatedness satisfaction, e.g. *During Juicy June, I felt part of a Juicy June group*, and 4 measuring relatedness frustration, e.g. *Regulating my food intake as a part of Juicy June sometimes was a cause of tension with people who are important to me*); 8 measuring competence (4 for competence satisfaction, e.g. *I felt competent at taking part in Juicy June*, and 4 for frustration, e.g. *I doubt whether I was able to execute Juicy June properly*) and 8 items measuring autonomy (3 measuring autonomy satisfaction, e.g. *The tasks I had to do during Juicy June were in line with what I really want to do*, and 5 autonomy frustration, e.g. *During Juicy June, I often felt like I had*

to follow other people's commands). Items were scored on a five-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree).

Intentions to continue with Juicy June swap*:* This was measured using a single item: *How likely or unlikely is it that you will continue with your Juicy June swap regularly in the future?* (7 point scale from very unlikely to very likely) (Åstrosm & Rise, 2001).

Self-efficacy: Three questions assessing whether Juicy June has increased participants' self-efficacy to make dietary changes was adapted from Puhl et al. (2013): *Juicy June provided a clear action or behaviour for me to engage in to improve my diet; Juicy June offered strategies for achieving the intended change in my diet; I feel like I had the ability to engage in swapping my unhealthy snack for a healthier one promoted in Juicy June,* while two questions were taken from the Juicy June evaluation focus group: *Juicy June gave me a 'kick-start' to change one small thing in my diet; Juicy June inspired me to introduce other dietary changes* assessed on a five- point Likert scale (from strongly disagree to strongly agree). The reported reliability for this scale was Cronbach's α= .95.

The full set of measures used in this study can be seen in Appendix 5.8.

5.2.5 Analysis

Data were analysed using IBM SPSS Statistics 20. Demographic characteristics were explored using descriptive statistics and one way ANOVA to calculate the difference between those who completed a 4 week evaluation and those who did not. Support for the study hypotheses was established as follows:

Hypothesis 1: Fruit and vegetable consumption and snack consumption were entered into repeated measures ANOVA as within-subject factor with three levels (baseline, 4 week evaluation and 8 week evaluation).

Hypothesis 2: Social support was entered into repeated measures ANOVA as within-subject factor with two levels (baseline and 4 week evaluation).

Hypothesis 3: Autonomous motivation for weight control was entered into repeated measures ANOVA as within-subject factor with three levels (baseline, 4 week evaluation and 8 week evaluation).

Hypothesis 4: Correlation analysis was undertaken to explore associations between changes in diet and their relationship with changes in social support and changes in autonomous motivation.

Hypothesis 5: Correlation analysis was undertaken to explore associations between need satisfaction and frustration, changes in autonomous motivation, and changes in the dietary outcomes. Multiple regression analyses were conducted to assess each component of the proposed mediation model (need satisfaction and need frustration- independent variables; changes in autonomous motivation- mediator; changes in dietary outcomes- dependant variable) Mediation was explored through calculating bootstrap confidence intervals of indirect effects for hypothesized mediated relationships (based on 5000 iterations) (Preacher & Hayes, 2008).

Hypothesis 6: Mean scores for habit formation during the 4 weeks of the intervention were calculated to establish strength of the habit. Repeated measures ANOVA were used to explore whether the behaviour has become more automatic during the duration of the study. Additional independent effect of habit was assessed using ANCOVA with changes in dietary outcomes as dependant variables, changes in habit as independent variables, while changes in social support and autonomous motivation were entered as covariates.

Use of Facebook was estimated by examining Facebook statistics for community pages: (i) reach, which reports the number of unique people who have seen the posts and (ii) Facebook engaged users, the number of unique people who have clicked on a given Facebook post. Facebook 'likes' and the number of posts left by participants were also counted to assess Facebook intervention engagement.

5.3 Results

All participants provided baseline assessment data (n=91), sixty-one participants (67%) completed the Juicy June 4-week follow-up and 37 (40.6%) provided the 8-week follow-up data. Missing data was handled using the baseline observation carried forward as it was assumed that participants for whom the data was missing had dropped out and their outcome values had not changed (as we did not assume deterioration). Although this approach could lead to a bias such as underestimation of the variance, it does not overestimate the intervention effect as participants for whom data were missing were assumed to revert to baseline scores (Unnebrink & Windeler, 2001).

Data distribution and normality

Normal distribution of the data was checked by computing Q-Q plots with normal distribution plotted and computing Kolmogorov-Smirnov test. Based on the results of the Kolmogorov-Smirnov test, the majority of variables were not normally distributed; however, the examination of Q-Q histograms revealed that the variables were close to normal distribution. Thus it was decided that parametric tests will be used. Levene's statistic was used to test for homogeneity of variance. The majority of variables studied demonstrated homogeneity of variance. Two outliers were identified (scores in self-reported fruit and vegetable intake) and were corrected by converting back from a z-score as recommended by Tabachnik et al. (2001).

The majority of measures used in this study had good internal reliability ranging from .53 to .89. Three measures had lower internal consistency: Motivation for weight control amotivation subscale: 0.46; autonomy satisfaction Cronbach's alpha=.49 and relatedness satisfaction Cronbach's alpha=.50. For more details on the measures' internal reliability see Appendix 5.9.

5.3.1 Participants

112 participants volunteered to take part in the study, of those 94 (83.9%) completed the baseline questionnaire and were provided with feedback on their diet. Three participants withdrew from the study (two for health reasons and one participant felt that her diet is very healthy and there is no room for improvement). The results are based on the data obtained from 91 participants. The majority of the sample were females (85.7%), from a White ethnic background (89.0%). Participants' mean age was 34.76 years (SD=10.33) and mean BMI at the baseline 25.75 (SD=5.74). According to the BMI criteria (WHO, 2013a), 2 (2.2%) participants were classified as underweight (BMI< 18.5), 53 (58.2%) as healthy weight (BMI between 18.5-24.9), 21 (23.1%) as overweight (BMI between 25-29.9) and 15 (16.5%) as obese (BMI over 30). BMI data for one participant was missing. Full participants' characteristics are presented in Table 5.2. There were no significant differences in any of the baseline measures such as fruit intake between those who completed the 4 week evaluation (n=61) and those who completed baseline assessment only (n=30). See Appendix 5.10 for more details.

Table 5.3 Demographic characteristic and perceived health status of the sample.

Variable	n	%
Gender (% females)	78	85.7
Ethnicity (% White)	81	89.0
Employment		
Full time/ Part time/Self employed	66	72.5
Student	24	26.4
Unemployed/Disabled/ Too ill to work	1	1.1
Smoking status		
Never smoked	71	78.0
Current smoker	3	3.3
Ex-smoker	17	18.7
Special diet		
No special diet	73	80.2
Weight loss diet	2	2.2
Vegetarian or vegan	13	14.3
For medical reasons	3	3.3
Health rating		
Poor	1	1.1
Fair/ good	65	71.5
Very good/ excellent	25	27.5
Weight self-perception		
Very underweight/ somewhat underweight	2	2.2
About right	28	30.8
Somewhat overweight/ very overweight	61	67.0
Weight concern		
Not at all concerned/ not very concerned	38	41.8
Quite concerned/ very concerned	53	58.2
Weight harmful to health		
Not at all harmful/ not very harmful	59	64.8
Quite harmful/ very harmful	32	35.2
Weight control		
Not doing anything in particular for my weight	35	38.5
Actively doing things to try to avoid gaining weight	36	39.6
Actively doing things to try to gain weight	0	0
Actively doing things to try to lose weight	20	21.9

5.3.2 Main analysis

Goal adherence

Participants on average consumed their proposed Juicy June fruit or vegetable 4.8 days a week (SD = .89, range = 2.5-6.5), while they consumed the snack they were trying to avoid on average 1.98 days per week (SD =1.18, range = 0-4.5).

Hypothesis 1*:* The intervention was successful in bringing about changes in fruit and vegetable consumption, $F(2, 180)= 15.85$, $p< .01$, with participants consuming 1.47 servings of fruit and vegetables more at the end of the intervention (4-week evaluation). This effect was maintained at the 8-week evaluation with participants eating on average 1.12 more portions of fruit and vegetables a day compared with baseline measures ($p< .01$). There was no significant decrease in snack consumption at 4–weeks or 8-weeks ($p= .39$), therefore Hypothesis 1 was only partially supported. A positive significant effect was observed for fat intake, $F(1.27,114.30)= 15.93$, $p< .01$, with participants lowering significantly their fat intake - and this decreased fat intake was maintained at the 8-week evaluation. There was no change in other values (fibre, BMI). Means, standard deviations and effect sizes are presented in Table 5.4.

Hypothesis 2: The intervention was successful in increasing participants' perceived social support for healthy eating, with a significant increase in perceived social support observed between baseline and 4 week evaluation ($F(1,89)= 5.57$, $p= .02$); therefore, Hypothesis 2 was supported. Means, standard deviations and effect sizes are presented in Table 5.4.

Hypothesis 3: A significant change in autonomous motivation towards healthy eating was observed, $F(2,178)= 4.94$, $p< .05$, with a near to significant improvement in autonomous motivation between baseline and 4-week evaluation ($p= .07$). However, this increase was not sustained beyond the end of the intervention. Means, standard deviations and effect sizes are presented in Table 5.4.

Table 5.4 Repeated measures ANOVA for the whole sample (n=91)

	Baseline	4-week evaluation	8-week evaluation	F value	Effect size Cohen's d (95% CI)		
	M (sd)	M (sd)	M (sd)		Baseline vs. 4-week evaluation	4-week evaluation vs. 8-week evaluation	Baseline vs. 8-week evaluation
Fruit & veg (number of portions)	4.52 (2.75)	5.99 (3.62) [a]	5.65 (3.27) [b]	*F*(2, 180)= 15.85, *p*< .01,	-.46 (-.92; .01)	.09 (-.40; .59)	-.41 (-.89; .11)
Fibre	27.48 (9.77)	28.86 (11.46)	28.65 (9.85)	*F*(1.60, 143.62)= 2.05, *p*= .14	-.13 (-1.66; 1.41)	.02 (-1.52; 1.56)	-12 (-1.54; 1.30)
Fat	25.88 (10.59)	22.11 (10.28) [a]	22.01 (9.97) [bc]	*F*(1.27,114.30)= 15.93, p< .01	0.36 (-1.14; 1.87)	0.01 (-1.45; 1.47)	0.38 (-1.11; 1.84)
Snack intake	18.75 (4.31)	18.43 (9.18)	17.79 (4.45)	*F*(1.138,102.43)= .79, *p*= .39	.04 (-.99; 1.08)	.09 (-.95; 1.13)	.22 (-.41; .85)
BMI	26.02 (5.89)	25.86 (5.86)	25.60 (5.37)	*F*(1.10, 83.49)= 1.37, *p*=. 25	.03 (-.82; .88)	.05 (-.77; .86)	.07 (-.73; .88)

[a]- denotes significant difference between baseline and 4 weeks; [b]- denotes significant difference between baseline and 8 weeks; [c]- denotes a significant difference between 4 weeks and 8 weeks

Table 5.4 cont. Repeated measures ANOVA for the whole sample (n=91).

	Baseline	4-week evaluation	8-week evaluation	F value	Effect size Cohen's d (95% CI)		
	M (sd)	M (sd)	M (sd)		Baseline vs. 4-week evaluation	4-week evaluation vs. 8-week evaluation	Baseline vs. 8-week evaluation
Autonomous motivation	5.21 (1.30)	5.37 (1.19)	5.16 (1.28) [c]	*F*(2,178)= 4.94, *p*= .01	-.13 (-0.31; 0.05)	0.17 (-0.01; 0.35)	0.04 (-0.15; 0.22)
Controlled motivation	3.24 (1.20)	3.27 (1.25)	3.10 (1.26)	*F*(2,178)= 2.33, *p*= .10	-.20 (-.20; .15)	.14 (-.04; .32)	.11 (-.06; .29)
Amotivation	1.86 (0.85)	2.00 (0.90)	1.87 (0.85)	*F*(2,178)= 2.52, *p*= .08	-.16 (-.30; -.03)	.15 (.92; .28)	-.01 (-.13; .11)
Social support for healthy eating	2.78 (0.69)	2.90 (0.71)	Not evaluated	*F*(1,89)= 5.57, *p*= .02	-0.17 (-0.27; -0.07)		

[a]- denotes significant difference between baseline and 4 weeks; [b]- denotes significant difference between baseline and 8 weeks; [c]- denotes a significant difference between 4 weeks and 8 weeks

Table 5.5 Correlations between changes in motivational styles, need satisfaction, need frustration and changes in dietary outcomes (change between baseline and 4-week evaluation).

	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1. Autonomous motivation	.23*	-.04	.06	.17	-.07	.10	.07	.01	.29*	.04	.25*	-.01	-.23*	-.07	-.10	.22
2. Controlled motivation		.12	-.18	-.11	-.15	-.13	-.13	-.09	-.09	-.06	-.14	-.15	.07	.12	.03	.03
3. Amotivation			-.08	.08	-.04	-.07	-.07	.04	.02	.15	.04	.11	.09	.08	.11	.08
4. Basic needs satisfaction				.57**	.73**	.93**	.44**	.47**	.49**	.21	.15	.17	-.18	.06	.03	.16
5. Basic needs frustration					.46**	.55**	-.01	.80**	.80**	.66**	.08	.02	-.22	-.13	.11	.31*
6. Autonomy satisfaction						.57**	-.07	.55**	.32**	.17	.11	.15	-.02	.00	-.25	.08
7. Competence satisfaction							.25**	.45**	.55**	.21	.08	.06	-.20	-.01	.22	.20
8. Relatedness satisfaction								-.08	.04	.02	.20	.26*	-.15	.21	-.04	.01
9. Autonomy frustration									.47**	.40**	.09	-.01	-.05	-.16	.01	.13
10. Competence frustration										.22	.06	-.07	-.21	.05	.05	.32*
11. Relatedness frustration											.05	.14	-.24	-.23	.20	.21
12. Support for healthy eating												.10	-.10	-.19	-.21*	.21
13. Fruit & vegetable intake													-.02	.14	-.20	.07
14. Fat intake														-.05	-.10	-.12
15. Fibre intake															.02	.18
16. Snack intake																.10
17. Habit change																

*Notes: *p< 0.05 (2-tailed), ** p<0.01 (2-tailed)*

Hypothesis 4: The associations between changes in motivational styles, social support and dietary outcomes were weak with two significant associations reported: an increase in autonomous motivation was associated with a decrease in fat intake, *r*= -.23, *p*< .05, while an increase in social support was associated with a reduction in snack consumption, r=-.21, p<.05; therefore, Hypothesis 4 was only partially supported.

Hypothesis 5: The intervention was perceived as autonomy and competence, but not relatedness satisfying. None of the three basic needs was frustrated.

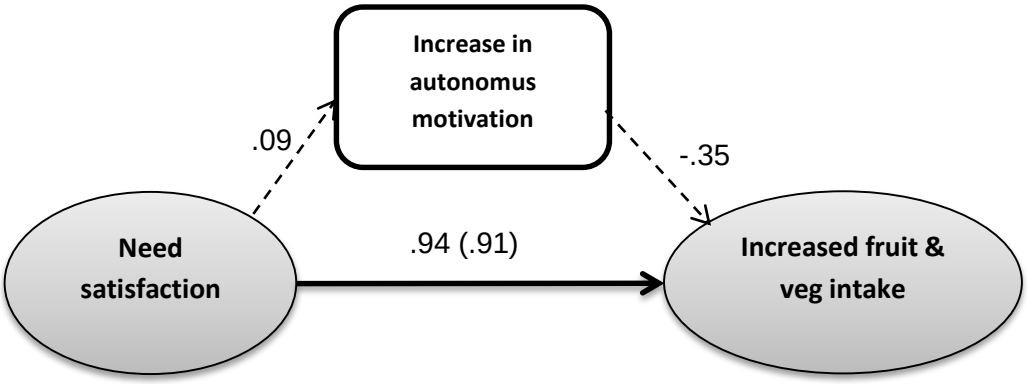
Table 5.6 Juicy June and basic needs satisfaction and frustration* (n=61)

Basic need	**M (SD)**
Intervention autonomy satisfaction	3.64 (.66)
Intervention autonomy frustration	3.96 (.59)
Intervention competence satisfaction	3.15 (.81)
Intervention competence frustration	3.21 (.96)
Intervention relatedness satisfaction	2.43 (.77)
Intervention relatedness frustration	3.28 (.71)

** Scores ranged from 1- strongly disagree to 5- strongly agree with middle score labelled 3- neither agree nor disagree, therefore scores higher than 3 indicate agreement. Scoring for need frustration was reversed so higher numbers = more positive outcomes in all measures*

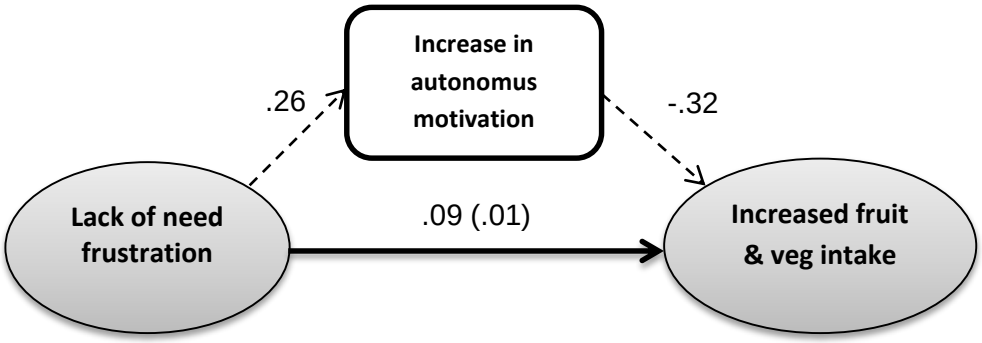
Correlation analyses suggested that an increase in relatedness satisfaction was associated with an increase in fruit and vegetables intake, r= .26, p< .05, and no other relationships were found. Mediation analyses demonstrate that results were not significant for the mediation effect of the increase in autonomous motivation on the relationship between basic need satisfaction or frustration and increased fruit and vegetable intake (for more details see Figure 5.2). Hypothesis 5 was not supported.

Figure 5.2 Mediation effect (regression weights) of the increase in autonomous motivation on the relationship between basic need satisfaction and increased fruit and vegetable intake



*Please note: *p< .05, **p< .01,*

Figure 5.3 Mediation effect (regression weights) of the increase in autonomous motivation on the relationship between lack of need frustration and increased fruit and vegetable intake

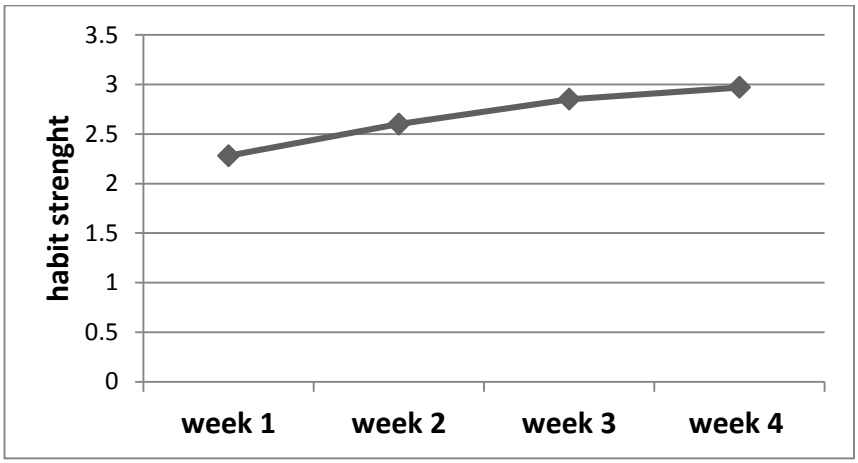


*Please note: *p< .05, **p< .01*

Hypothesis 6: Habit strength was relatively weak, but did significantly increase by the end of the intervention, $F(3, 204)= 25.86$, $p< .01$ (see Figure 5.4). There were no associations between habit increase and changes in the study outcomes (correlation between habit increase and increase in fruit and vegetables, r= .07, ns, and between habit increase and fat intake, r= -.12, ns). Increases in habit did not have an additional independent effect on

dietary changes (for fruit and vegetable intake: $F(15,68)= 1.32$, $p= .23$; for fat intake: $F(15,68)= .92$, $p= .55$).

Figure 5.4. Changes in habit formation over 4 weeks of Juicy June.

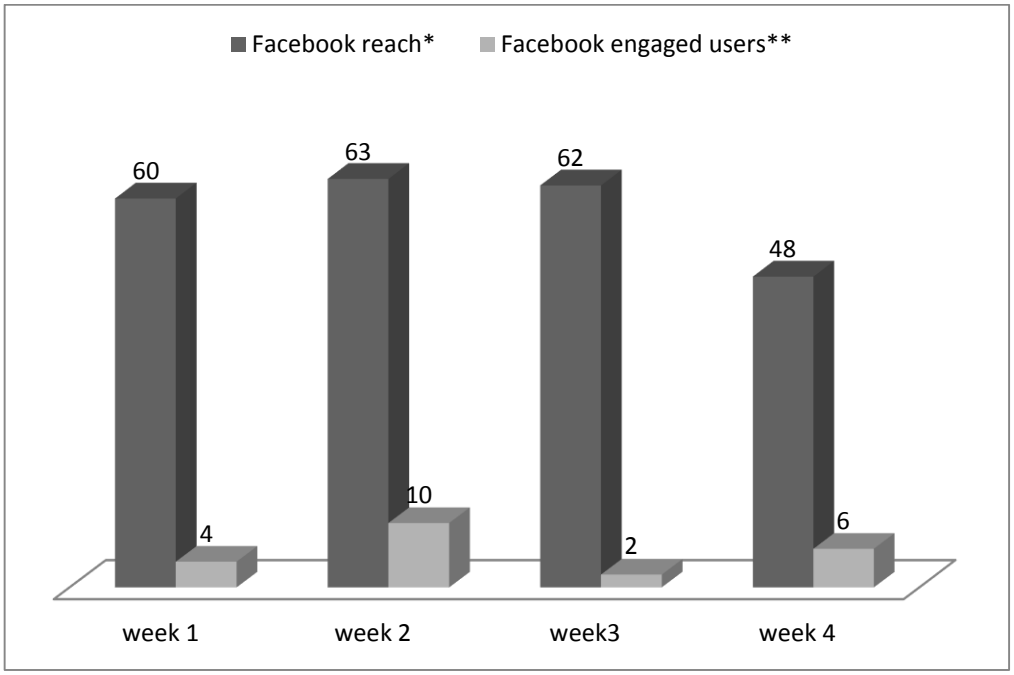


Active engagement with the programme

Use of Facebook

41 participants 'liked' Juicy June Facebook community page. There were 19 posts posted by the group moderator during Juicy June and throughout the duration of the study engagement varied. The number of people who made a post was very low (5 in total), Facebook reach (the number of unique people who have seen the post) varied between 23 and 119 for different posts and Facebook engaged users (the number of unique people who have clicked on the post) varied between 0 and 16. For more details on the use of Facebook see Figure 5.5.

Figure 5.5 Use of Facebook by Facebook reach and Facebook engaged users.



** Facebook reach- the number of unique people who have seen the post, ** Facebook engaged users- the number of unique people who have clicked on the post*

5.3.3 Establishing Juicy June acceptability

Participants were allowed to select more than one reason for participation in Juicy June. The three most common reasons for taking part were: to improve eating habits (76.7%), to cut back on unhealthy foods (70%) and to increase the number of portions of fruit and vegetables (68.3%). The majority (63.9%) of participants felt replacing an unhealthy eating habit with a healthier eating habit was easier with Juicy June than it would be on their own. Approximately half (49.2%) of the participants found swapping habits difficult or very difficult, while 26.2% felt it was easy or very easy. As to the perceived benefits of taking part, 73.8% felt that they were more likely to consider making other similar swaps including fruit or vegetables, and around 40% were more aware of the benefits of fruit and vegetables as a result of taking part in Juicy June. In terms of interaction with others, only 26.2% of participants felt part of the Juicy June community, however at the same time 42.6% had more conversations about healthy eating with friends and family during Juicy June. For more details on Juicy June acceptability see Appendix 5.11.

5.3.3.1 Focus group results

Discussion group with Juicy June participants

Participants for the discussion group exploring the experience of taking part in Juicy June were recruited among those who registered for Juicy June. Due to the location of the discussion group, only staff and students of the University of Bath who took part in Juicy June were invited. Invitations were sent to both those who completed the study (N=11) and those who did not (N=14) as the aim of the discussion group was to evaluate the overall experience. Each participant invited to take part in the discussion group was sent two emails (an email inviting them to take part and a reminder). There was no response from participants who had not completed the 4-week or 8-week evaluation. Among those who completed both follow ups, eight participants volunteered and six took part on the day.

Discussion group with Juicy June participants

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All participants were female, aged between 25 and 58 years and their BMI ranged between 18.6 and 26.3 (full demographic characteristic are presented in Appendix 5.12). The following topics were covered during the discussion group: healthy eating and challenges encountered when trying to address diet; Juicy June experience (reasons for taking part, social support during Juicy June, monitoring Juicy June progress); sustained changes in diet as a result of taking part in Juicy June. At the end of the interview participants were shown a selection of posters from alcohol and tobacco abstinence campaigns (see Appendix 5.13) and participants were asked whether they think a similar approach could be used in obesity domain (e.g. signing a pledge not to eat crisps for a month). A full list of topics discussed can be seen in Appendix 5.14. Data obtained during the discussion group

was analysed using Thematic Analysis (Braun & Clarke, 2006). The discussion group lasted 52 minutes. Four main themes were identified and they are presented in Appendix 5.15.

Positive experience

Participants of the discussion group enjoyed taking part in Juicy June. Juicy June was rated positively as participants experienced the benefits of taking part in it like feeling healthier or more energetic. Participants also appeared to like Juicy June as they were asked to introduce a dietary swap, rather than to stop having an unhealthy snack only. This gave them an impression that there was something they could replace their unhealthy snack with, rather than depriving themselves.

Use of Juicy June resources

During Juicy June participants were provided with a number of resources that aimed to help them achieve the swap more successfully. One of the resources was creation of the Facebook community which aimed to facilitate social support seeking. Participants of the discussion group expressed a view that they looked at posts published on Facebook, but not very regularly, usually at the end of each weekly evaluation. And although they were reading the posts, they were not leaving any comments (while a large proportion of posts by the group moderator encouraged them to leave posts and interact; see Appendix 5.5). When participants were asked about possible reasons for the lack of interaction between Juicy June users on Facebook, participants felt that it did not feel natural to interact with people that they did not know and exchanging posts about eating fruit and vegetables was not something they would normally post on Facebook. When asked about the use of Juicy June calendars that each participant was provided with, participants expressed a view that although it was a helpful tool to monitor their progress, they only used it regularly at the beginning of Juicy June or did not use it at all as they felt they did not need it.

Difficult to eliminate unhealthy snacks

Participants felt it was difficult to implement a full Juicy June swap (replace unhealthy snack with a healthier snack). Participants felt having unhealthy snacks was a well-established habit that they would engage in without consciously thinking. Participants also craved their usual unhealthy snack and felt that having Juicy June food was not enough to satisfy that craving. Even when participants were successful at having Juicy June food instead of their usual snack, they often had a different unhealthy snack at a later time to compensate for the lack of their usual snack. Participants also expressed a view that fruit and vegetables are not very appealing compared with different types of snacks offered in shops. Many fruit

and vegetables require preparation, while unhealthy snacks are ready to eat. Another reason why participants felt it was difficult to eliminate unhealthy snacks was perceived lack of support for a healthy lifestyle from food and social environment such as having crisps available for purchase in the work kitchen.

Translating intentions/plans into actions

According to participants, Juicy June offered them an opportunity to introduce a change they have thought about or intended to implement in the past. Therefore participants had already made plans to introduce small improvements into their diets, but Juicy June helped them translate their intentions into actual behaviour. They also felt Juicy June had a positive impact on their future plans and intentions as after taking part in Juicy June they will be more likely to introduce those changes as Juicy June has demonstrated that simple improvements can be introduced.

5.4 Discussion

The aim of the current study was to test and evaluate a pilot study by testing short-term effectiveness, exploring reactions to the intervention and determine whether target population complies with the procedure and testing the mechanism of the intervention effect and to identify any shortcomings.

5.4.1 Effects of the intervention on dietary intakes

The intervention resulted in a significant increase in fruit and vegetable intake and a significant reduction in fat intake. No change was achieved for snack intake, fibre intake or BMI. The scale of changes for fruit and vegetable intake were similar to those achieved in other types of intervention promoting fruit and vegetable consumption. For example, a systematic review of interventions designed to increase adult fruit and vegetable intake identified 44 studies (mostly studies conducted in developed countries) and among healthy adults an increase of 0.1–1.4 serving/day was seen compared with 1.47 servings in the present study (Pomerleau et al., 2005). Another systemic review of 36 randomised controlled trials conducted in the US, found an overall increase in fruit and vegetable consumption of 1.13 portions/day (Thomson & Ravia, 2011). However, many of the studies included in these reviews assessed fruit/vegetables increase as a net difference between control and intervention group at evaluation rather than change in intake within the intervention group, however usually no change in the control group was reported, therefore results are comparable. In terms of the effect size, the effect size for the change in fruit and vegetable consumption in the current study was of medium size (.46). A review that looked

at 16 worksite interventions that focused on improving employee diets that lasted at least 8 weeks, reported small effect sizes (Mhurchu, Aston, & Jebb, 2010). Although the effect size for an increase in fruit and vegetable consumption in the current study was not significant (i.e. confidence intervals not significant), it is possible that significant change would be detected through a larger sample size.

In addition, the results should be linked to dietary recommendations to establish whether the intervention achieved the increase necessary to achieve recommended levels of intake of fruit and vegetables. Given that participants in the current study were consuming on average 4.52 portions per day at the baseline and 5.99 at 4-week follow up and the current dietary guidelines recommend to eat at least 5 portions of fruit and vegetables a day (NHS Choices, 2011b), an increase of 1.47 appears clinically meaningful. An increase of 1.47 servings per day would also offers a meaningful increase for the English population as in 2011, adults consumed on average 4.1 portions of fruit and vegetables per day (The Health and Social Care Information Centre, 2013). However, it appears that the current study has attracted individuals who were predominantly of healthy weight (60%) and who had a healthy diet (e.g. low average baseline fat intake according to DINE questionnaire), and for whom only a small increase was necessary to achieve recommended fruit and vegetable intake. Therefore it is not known whether this approach might work for overweight groups or people with a less healthy diet at a baseline. Post-hoc analyses were undertaken to establish whether the approach used might be useful for those with a less healthy diet at a baseline. A median split (low baseline intake of fruit and vegetables- M=2.51, SD=1.37; vs. high baseline intake of fruit and vegetable- M=6.88, SD=1.96) showed that the group with a lower baseline intake of fruit and vegetable achieved a larger increase (M=1.75, sd=2.6) than those who had a higher intake of fruit and vegetables at the baseline (M=1.12, sd= 3.1); however, this difference was not statistically significant, $F(1,90)= 1.13$, $p= .29$. Increases in fruit and vegetables were also analysed for participants who were consuming 2 or fewer portions of fruit and vegetables per day at baseline (N=20) and results demonstrate that their intake increased on average by 2.3 servings per day, $F(2,38)= 8.27$, $p< .001$. Therefore, although mostly healthy weight, healthy eating participants were recruited, this approach appears successful for those with low fruit and vegetable intake at the baseline.

5.4.2 Juicy June as a potential obesity prevention intervention

While participants of Juicy June achieved significant increases in fruit or vegetable intake, their intake of snacks was not reduced as a result of taking part in the intervention. Only one study which aimed to encourage participants to replace a specific unhealthy snack with a healthier one has been identified and it was an intervention that employed one specific behaviour change technique- implementation intention (Adriaanse, de Ridder, & de Wit, 2009). In that study, two experiments were conducted: in the first one participants (118 female students) were assigned to three study groups and were asked to form implementation intentions addressing the situational cues to eat unhealthy snacks (intervention group 1), implementation intentions addressing the motivational cues (perceived reasons for snacking- intervention group 2) or control condition. All groups were asked to keep a food diary for seven days. The results showed that implementation intentions specifying situational cues (intervention group 1) were not effective for reducing unhealthy snacks or increasing healthy snacking. Motivational cues (intervention group 2) were effective in promoting healthy snacking, however this approach has not reduced unhealthy snacking (suggesting that healthy snacks have not replaced unhealthy snacks). However as triggers for snacking tend to be very personal, a second study was conducted as part of that research which compared the effectiveness of personal motivational cues for unhealthy snacking with traditional situational cues such as place to decrease the amount of unhealthy snacking. The results showed that specifying the underlying personal motivational cue for unhealthy snacking resulted in an increase in healthy snacking and a decrease in unhealthy snacking. This might suggest that addressing the reason why people snack (rather than where and when) might be important for breaking unhealthy habits. Although that study produced some promising results, its generalizability is limited as it only included women, was conducted for one week and was underpowered to demonstrate that the two types of implementation intention were different from each other. The described study was different from the Juicy June intervention as in the current study participants were asked to plan which snack of the day they would replace with a different snack, rather than specifying a situation (e.g. alone or with friends) or a motivational situation (e.g. feeling bored) in which they usually eat unhealthy snacks and choosing a healthy snack they would have in that situation.

Other studies which have used implementation intentions to either promote healthy eating behaviours such as eating more fruit or to reduce unhealthy eating (e.g. snacking) have produced positive effects for healthy snacking, but not for unhealthy snacking. A review of such studies demonstrated that in 12 out of 15 studies promoting healthy eating a medium

effect size was found for increased fruit and vegetable consumption, while the effect of implementation intention on unhealthy snack intake was small and only found in one third of studies. These results suggest that implementation intentions have a positive effect for the initiation of the new healthy behaviours, however effects were limited for studies that aimed to diminish unhealthy eating (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011).

The results from the current study and from the studies reviewed above suggest that such approaches employing a counter-conditioning which is substituting a new behaviour for an old one, might be more successful in helping people to establish new habits rather than to extinguish old ones. This might be in part explained by the type of goal such interventions aimed to achieve (approach vs avoidance goals). Approach goals focus on trying to achieve a positive outcome (e.g. eat more fruit), while avoidance goals aim to avoid a negative state (e.g. eat less fat) and approach goals tend to be more effective; while the pursuit of avoidance goals in the long term has a detrimental effect (Elliot & Thrash, 2002). Goal striving employed in the current study (i.e. eat a healthier snack instead of a less healthy one) might have been difficult to accomplish as initiation and monitoring of the behaviours was a conscious effort (Mann, de Ridder, & Fujita, 2013), however snacking is a complex behaviour (De Graaf, 2006), often habitual, and therefore it is triggered automatically in response to contextual cues (Gardner, Lally, & Wardle, 2012). Qualitative research conducted as a part of this study further supports this notion that participants felt they were not successful in implementing the full swap as breaking an old habit was the most difficult part of the intervention. Breaking existing habits might require more elaborate strategies: an ecological approach or employing a combination of techniques (Riet et al., 2011). This could include stimulus control implemented by policy-makers (e.g. reducing the number of fast food restaurants) (Neal et al., 2006) or combining vigilant monitoring with implementation intentions and counter-conditioning (Verplanken & Wood, 2006).

Another finding that warrants discussion is demographic and health characteristics of participants who took part in this study. The current study aimed to use a similar recruitment to that used in tobacco or alcohol abstinence campaigns (i.e. open to all) rather than targeting a specific group (e.g. those at risk) and it was also informed by the results of studies investigating how overweight and obese people respond to obesity campaign messages and how to engage overweight/obese people in making efforts to lose weight (Puhl, Peterson, & Luedicke, 2012). Based on these findings current intervention aimed to communicate a relatively simple message, relatively achievable task, used a non-stigmatising approach, provided a positive message and was not referring to obesity or

weight. It was hoped that such an approach to recruitment and the way the intervention message was communicated would result in a diverse sample, but with a high proportion of those at risk (unhealthy weight or low baseline intake of fruit/vegetables).

However, the recruitment and the message conveyed was appealing to relatively healthy weight and healthy eating individuals with high baseline autonomous motivation for weight control. This is an interesting finding itself as it suggests to whom the intervention was appealing. Results from Study 2 conducted as a part of this thesis suggest that autonomy motivation for behaviour change might be an important pre-requisite for health message acceptance, therefore individuals who had intrinsic motivation towards weight control attended the study recruitment and signed up to take part in Juicy June. Although this is an interesting finding as it suggests for whom the intervention would be effective — as interventions are contingent upon the characteristics of the sample and are unlikely to be effective across the whole population (Albarracín et al., 2005) — the aim of the tobacco and alcohol interventions was not only to engage those at risk, but to create a mass change and turn the campaign into a movement. Every year the participation rate would increase as according to the social contagion of behaviour, a behaviour spreads through a population through exposure and as a result would become normalised (Smith & Christakis, 2008). For example Australian Dry July was first run in July 2008 when over a 1000 people took part; in 2010 9000 participated, but it increased to over 18,000 in 2013 (Dry July, 2012). In 2011, the majority of participants in Febfast reported that they knew at least one person such as a friend or family member who had also participated, and one third participated with their family members, friends or work colleagues (FebFast, 2011), which suggests the important role of social influences on participation in such events.

These findings taken together might suggest that Juicy June was an effective intervention to boost fruit intake, but not an effective obesity prevention intervention as total energy intake might be higher as a result of taking part in this study. Having an extra portion of fruit that would not substitute for a usual unhealthy snack, would provide an extra 11,730 calories per year (if we assume that one portion has approx. 50 kcal an equivalent to an average apple; NHS Choices, 2014) and this extra food intake would result in a weight gain of 1.67kg (3lb 10oz) per year. In addition, it appears that the majority of participants of the current intervention were relatively healthy individuals with high autonomous motivation towards weight control. Therefore Juicy June might not offer a feasible obesity prevention approach; however, if it was run every year on a large scale, it might offer a promising approach that would help in the normalisation of eating healthy snacks.

5.4.3 Support for the proposed theoretical model

Although the intervention resulted in significant improvements in autonomous motivation, the proposed theoretical model by which intervention exerted its effects was not supported. The intervention was perceived as satisfying participants' need for autonomy and competence, but need satisfaction was not related to increased autonomous motivation. This is not in line with the SDT theory where autonomous motivation will be facilitated through promoting need satisfaction and guarding against need frustration (Deci & Ryan, 2002). This a-theoretical finding could arise due to a number of reasons. Firstly, measures used to evaluate the effects of the intervention lacked specificity (i.e. measuring motivation for the wrong behaviour relative to the outcome); therefore, measures were not able to capture the changes as they were not specific enough. A questionnaire measuring motivation was asking participants about their motives for healthy eating; perceived social support was also measured in relation to healthy eating rather than in achieving specific dietary changes related to Juicy June and assessed support from friends, family, colleagues and did not address perceived social support from other participants in Juicy June. Basic need satisfaction and frustration was addressing Juicy June specifically. This suggests that the questionnaire was measuring these constructs at different levels of specificity (healthy eating in general vs. Juicy June specific questions).

Therefore it is possible that the model could have been supported if the right needs and motives were measured. This was the case in the study by Fuemmeler et al. (2006) which was a church-based intervention to increase fruit and vegetable consumption based on the SDT premises for African-Americans where four churches were randomised to the control condition and eight to the intervention condition (470 participants from the intervention churches). Intervention included four elements: self-help materials, changes to the church policies such as setting guidelines regarding what food can be served, core church wide activities and peer counselling based on motivational interviewing. It was predicted that social support, self-efficacy, autonomous and controlled motivation would mediate the effects of the intervention on subsequent dietary changes. Variables assessed were measured at the same level of specificity and addressed fruit and vegetable intake. As a result of the intervention, fruit and vegetable consumption increased from 5.51 to 6.83 portions per day. Only social support and self-efficacy were significant mediators (mediated 20.9% of the effect) of the intervention on the fruit and vegetable intake. Autonomous motivation did not emerge as a predictor; however, it was a significant longitudinal predictor of change (i.e. changes in motivation predicted changes in fruit and vegetable intake at follow up). Therefore, it is possible that if current intervention measured outcomes at the same level of specificity (i.e. relating to Juicy June fruit and vegetable intake), support for

the proposed model could have been found. However, it is important to acknowledge the differences between the current study and the study by Fuemmeler et al. (2006) as the latter targeted a different type of social support, had a larger sample size and included the introduction of changes at an environmental level such as changes to the menu options.

It is possible that the intervention was not successful in influencing the mediators of change (i.e. the selected behaviour change techniques were not successful at promoting need satisfaction or motivation) and changes observed in these constructs (such as increase in social support) were derived from other sources (such as participants interacting offline). The use of Facebook group was employed in the current study as a mean of increasing social support, however there was a lack of engagement with the Facebook community page as evidenced by Facebook statistics. Similarly, in a study by Cavallo et al. (2012) of a physical activity intervention delivered online, both the intervention group that was enrolled on a Facebook page and control group that was not using social media achieved similar increases in perceived social support, which might suggest that participants from the control group were interacting offline. Lack of engagement on Facebook might suggest the difficulties of using social media in heath interventions as a source of social support (i.e. out of their naturally occurring uses). Participants of the discussion group explained their lack of interaction on Facebook by the fact that it is used to interact with people they know and interacting with strangers does not feel natural - and also posting information about dietary changes did not feel natural. Therefore, it is possible that Facebook might be effective as a mode of health intervention delivery (Bull et al., 2012; Mayer & Harrison, 2012; Napolitano et al., 2013) to for example disseminate information among participants, but does not appear to offer a good source of social support. Social groups created specifically for the given intervention outside Facebook, the effectiveness for which there is some support (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004), might be more useful in this regard.

Intervention could have been not successful in influencing the mediators of change as there is also some evidence that participants were not using behaviour change techniques they were provided with, therefore they did not receive the full intervention ‘dose’. For example, participants were asked to engage in self-monitoring by completing a Juicy June calendar. While calendar use was not recorded for all participants, the results of the discussion group suggested that participants did not use the calendar and they also failed to employ other methods of self-monitoring which they were encouraged to implement such as setting an email pop-up reminder. Therefore, although self-monitoring was employed as a behaviour change technique, it was not used by participants. Other dietary interventions that measured actual use of intervention components provided also reported that participants

did not engage with the full programme. For example, an intervention by Anderson et al. (2001) that aimed to improve diet quality of shoppers used tailored information and self-regulation strategies in 15 brief weekly segments delivered via kiosks placed in supermarkets. Participants viewed on average 10.36 (SD= 3.96) segments, even though they were offered shopping vouchers for visiting each segment (they could have earned approximately $140 in coupons available if they viewed every segment). In a study of weight loss intervention delivered over the internet, intervention groups submitted their weekly self-monitoring diaries and received therapist feedback that provided reinforcement and recommendations (which could have been an incentive for submitting the self-monitoring diary) (Tate, Wing, & Winett, 2001). Over 24 weeks of the programme, participants submitted on average 13.65 (SD=6.4) self-monitoring diaries. These findings suggest that it might be difficult to engage participants to take advantage of the full intervention even if participants are encouraged to do so by additional incentives. This also emphasizes the importance of measuring participants' actual engagement with the programme as it cannot be argued that the programme is effective if a large proportion of participants are not using the techniques provided.

Another possible reason for the lack of support for the specified model is that there were other mediators of change. It appears that participants who took part in this study were already motivated to improve their diet as suggested by quotes from the discussion group and high baseline autonomous motivation values, but found it difficult to enact their intentions. Therefore they have not represented the sample for whom the intervention was designed and for whom the model was specified (i.e. overweight or obese and unhealthy eating). This could suggest that the intervention worked by helping participants to translate their intention into behaviour rather than motivating individuals to take action (Sniehotta, Scholz, & Schwarzer, 2005). This would mean that the intervention has addressed volitional rather than motivational variable, and a different theoretical model/framework might be needed. One of such frameworks is the Health Action Process Approach (HAPA, Schwarzer, 1999), which suggests a distinction between the motivation and volition phase. According to the HAPA model, it could be predicted that variables related to self-regulation (such as self-monitoring) and self-efficacy would enable participants to make a transition from the motivation phase to volition phase. Social support also appears to be important and it might be hypothesised that it would be a direct precursor to self-efficacy (Anderson, Wojcik, Winett, & Williams, 2006) as it appears that social support can increase individuals' beliefs on whether they can produce a desired effect.

5.4.4 Limitations

A number of limitations to this study should be acknowledged. This study used observational design rather than randomised controlled trial, and therefore there is a possibility of bias and the influence of confounding factors. For example, participants' higher fruit intake following the intervention may not have been due to the intervention, such as measurement effects (i.e. receiving feedback on one's diet, and completing self-efficacy questionnaires etc.), but due to seasonal variations in fruit availability and price. This study included a convenience sample of adults, and the findings suggest that it attracted mostly intrinsically motivated, healthy eating individuals, and therefore the findings might not be generalizable to the general population. The sample of participants involved in the discussion group was further biased as no participants who dropped out from the study took part, and therefore the positive effects of the intervention could be overemphasized while the experiences of people who were not successful in completing the intervention remain unknown.

There were a number of limitations associated with data collection. Dietary information was collected using self-reported measures which might be subject to desirability bias as studies comparing self-reported food intake measures with diet recalls reported a relatively large bias due to social desirability in self-reported measures (Hebert, Clemow, Pbert, Ockene, & Ockene, 1995). This social desirability bias appears to be even larger in studies that use repeated measures to collect dietary information (Westerterp & Goris, 2002). It is also possible that participants mis-reported their dietary intake as they found dietary measures used in the current study difficult to complete; for example, the DINE questionnaire asks respondents about the number of rounded teaspoons of spread people use per day. In addition, although the DINE questionnaire accounts for typical sources in fat and fibre in a typical UK diet, it might have not captured the change in fibre as it only asks about a number of specific sources of fibre (Roe et al., 1994). However, currently there is no one method considered as a 'gold standard' for the measurement of dietary outcomes. Direct measures such as biomarkers or clinical indicators are more invasive and require higher human and financial costs (National Obesity Observatory, 2011a).

There were a number of limitations regarding study evaluation. Although participants in Study 1 (Phase 2) identified low self-efficacy as an important barrier towards behaviour change and many ideas of the current intervention (i.e., small, simple, achievable task) were related to promoting self-efficacy, changes in self-efficacy were not measured. The study did not include pre and post measures of need satisfaction and need frustration which did not allow for conducting a full mediation analysis which could have allowed a more in-depth

understanding of the intervention mechanism. Finally, some of the measures were assessed on different levels of specificity (i.e. some were relating to Juicy June foods while others to a healthy diet in general), which could have accounted for the lack of support for the specified mechanism of intervention.

This intervention was delivered over the Internet. While there is growing evidence for the effectiveness of internet-based interventions (Strecher, 2007; Van den Berg, Schoones, & Vlieland, 2007; Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004), the potential in terms of reach and breadth was not documented. Thus, the rate of enrolment relative to exposure to advertising materials is not known thus it cannot be established whether the intervention was perceived as appealing. The current study measured Facebook engagement by analysing Facebook statistics (Facebook reach and Facebook engaged users) therefore it cannot be established whether access to Facebook was associated with social support or whether participants obtained other benefits from it such as increased awareness of the benefits of a diet high in fruit and vegetables. There was a high participant attrition rate (40.6% of the initial sample completed the 8-week evaluation), however high attrition rates (dropouts and losses at follow-up) are one of the biggest challenges internet interventions face (Bennett & Glasgow, 2009).

5.4.5 Future developments for Juicy June

Recommendations to inform future intervention content

Although there were some promising results of the Juicy June pilot, it is premature to recommend that a full randomised controlled trial is run as a number of issues that could be improved have been identified and often good quality RCTs are preceded by a series of pilot studies which enable to refine the design (Craig et al., 2013). Therefore a full RCT is not suggested until the identified issues have been resolved. During the intervention there was a high level of attrition, as 33% of participants did not provide data at 4-weeks and majority (59.4%) of participants did not provide data at 8-weeks. High attrition rates are a common challenge of online trials (Bessell et al., 2002), they increase the risk of bias and might underestimate the effect of the intervention (Murray et al., 2009). Although in the current study non-responders were sent two email reminders at 7 day interval asking them to complete the survey, it has not increased response rate significantly. This is in line with other studies of online health interventions (Salyers-Bull, Lloyd, Rietmeijer, & McFarlane, 2004) where the use of email reminders was not an effective tool to boost response rate. Higher follow-up rates were reported in studies which used mixed-methods (e.g. postal

reminder or cash incentive). For example, in an internet based-weight loss programme study by Glasgow et al. (2007) the 12 month follow up rate for an email reminder was 22%, but it was more than doubled when email reminder was combined with a cash incentive (US$10) and the response rate increased to 48%. Similarly, in another study of online weight management where 85% of the initial sample did not provide follow up data at 12-month, a sample of non-respondents were sent either a postal or telephone reminders, and responses were received from 55% of those assigned to postal reminder and 59% to telephone reminder (Couper, Peytchev, Stretcher, Rother, & Anderson, 2007). In that study participants were also asked for the reasons for their non-response and 51.8% indicated technical problems such as problems submitting the online survey, while 37.8% stated the reasons associated with the intervention or survey such as perceived lack of effectiveness of the intervention.

Therefore while approaches such as telephone reminders might be useful for those who experience technical problems, a different approaches might be needed for those who lost interest in the intervention. For those who are no longer interested in the intervention the use of incentives has been suggested (Bennett & Glasgow, 2009), however care needs to be taken as the use of incentives would mean rewarding participants for engaging in the interventions therefore it might undermine their autonomous motivation for taking part. Research evidence suggest that a provision of a small incentives does not have a detrimental effect on motivation (Promberger & Marteau, 2013). For example, results from a recent randomised controlled trial investigating weight loss suggests that the offer and the receipt of small incentives does not undermine autonomous motivation or an increase in controlled motivation (Crane, Tate, Finkelstein, & Linnan, 2012), therefore incentives might offer one solution. It is also possible to incentivise both intervention participation and achievement of the intervention goal which was the case in the smoking cessation study by Volpp et al. (2009). Participants of that study who were assigned to the incentive condition compared with the information-only group had significantly higher enrolment rate (15.4% vs. 5.4%), higher participation rate (10.8% vs. 2.5%), higher quit rate and higher quit rate within the first 6-months (20.9% vs. 11.8%). This strategy also resulted in long term tobacco cessation after the provision of incentives was ended which might suggest that this strategy has not undermined employees autonomous motivation.

As this study intended to deliver an online intervention, a greater use of modern technology could be encouraged and for example a mobile phone application for dietary evaluation could be used. It is estimated that in 2012, 92% of adults used a mobile phone of which 62% were smartphone users (Ofcom, 2014). There are a number of smartphone

applications which enable users to estimate their food intake by taking photos of the food they consumed and a special application analyses the acquired image and calculates calories consumed (Silva, Lopes, Rodrigues, & Ray, 2011). The use of such application might lead to lower recall bias and higher compliance compared with a questionnaire available online (Tsai et al., 2007). However the use of mobile application would also pose issues regarding the motivation to use the application (as for example after any episode of eating individuals would have to enter that episode into the application) and motivation to continue with the intervention.

Results from the current intervention also suggest that while participants were not interacting on Facebook, their perceived social support for healthy eating has increased during the intervention possibly due to offline interaction. 42.6% of participants had more conversations about healthy eating with friends and family than they would normally have, therefore it is possible that people felt more able to talk about the intervention and get support from their families as a result of taking part in a wider campaign. This might suggest that the scale of a campaign per se or taking part in a campaign might be an important component of a behaviour change in its own right. This could possibly work by people's perception that they are taking part in 'something bigger' and this in turn might increase social support for their actions. Also evaluation of the Febfast campaign suggest that participating with known people was an important aspect of this campaign as one third of particpants who took part in the evalutaion particpated with friends, work colleagues, their partner or someone else (Victorian Health Promotion Foundation, 2012), however no impact of participating with someone else was evaluated. Therefore mobilising social support might be of key importance for the current internvetion. One way of increasing social support could involve a greater invovlement of family memebrs or friends by encouraging particpants to take part with soemone they know.

Finally, not only addressing limitations of the current intervention content, but also adding new elements could improve its effectiveness. It appears that participants were more successful in starting a new behaviour (eating an additional portion of fruit or veg), than stopping a current behaviour (not eating unhealthy snack) as suggested by the results of evaluations. Although the measure of snack intake was not specific enough to detect when snacks were eaten, the results from the focus group seems to suggest that participants ate their new snack option as per their intentions, but then rewarded themselves later with their usual less healthy snack. A possible reason for this is that having an unhealthy snack was for participants a habitual behaviour triggered by contextual cues, therefore the current intervention could have been more successful if it also addressed contextual cues as there

is considerable research suggesting that contextual cues such as salience of food items that increase snacking (Wansink, 2004). Research evidence suggests that a simple approach addressing food salience involving placing a basket of fruit that does not require preparation such as apples or pears in the workplace could help participants eat an extra portion of fruit and veg a day instead of their usual snack. This approach appeared successful in a 5-month long workplace controlled study and results indicated that participants not only increased significantly their daily fruit intake (by 112g, sd 35g per day), but also their added sugar intakes were decreased suggesting that fruit was used as a substitute for part of the sugar-sweetened food (Alinia et al., 2011). Similarly, in another work based intervention where 3 worksites were randomly allocated to: free fruit delivered every morning (group A), free fruit plus peer support and modelling (group B) or control group (group C) (Hutchinson, Howletts, & Wilson, 2013). Group A and B significantly increased their fruit consumption and lowered their snack intake, however only reduced high fat snack consumption was maintained in group B. Dietary changes that were observed in the workplace did not extend beyond and home fruit intake was not affected. This lack of long term effect could be explained by SDT as it would suggest the participants of this intervention have not internalised the value of having extra fruit, and were simply taking the advantage of free fruit and once the interventions ceased and no longer free fruit was provided. Therefore providing a free fruit with a rationale for behaviour change might be successful in promoting long term sustained behaviour change.

Implications for the research process

Previous section discussed possible recommendations on improving the intervention content, however a number of issues regarding the research process have been identified and the section below presents ways in which they could be amended. A number of improvements could be implemented in intervention evaluation. The current study measured Facebook engagement by analysing Facebook statistics: Facebook reach and Facebook engaged users. Facebook reach reports the number of unique people who have seen the posts, while Facebook engaged users provides the number of unique people who have clicked on a given Facebook post, therefore these two statistics simply measure activity, rather than whether people really engaged, how much time they spent, was it them or someone else (e.g. spouse) using the same Facebook account etc. These two measures also do not allow to establish whether access to Facebook was associated with social support or whether participants obtained other benefits from it such as increased awareness of the benefits of a diet high in fruit and vegetables. It is possible that in addition to objective measures, the use of self-reported measures of Facebook use such as Facebook Intensity

Scale (Cronbach's alpha = .83) (Ellison, Steinfield, & Lampe, 2007) which measures the extent to which individuals are actively engaged in Facebook activities (example item includes *Facebook is part of my everyday activity*), could have helped to capture the experience of using Facebook more accurately. It would be valuable if the evaluation of the campaign included evaluation of the use of techniques provided as it would allow comparison in terms of the outcomes between participants who employed techniques versus those who have not employed them. This would enable an assessment of the impact of using such techniques.

While qualitative data obtained from the discussion group can offer a valuable insight into some of the findings (as for example helps to evaluate the unexpected findings), a more diverse sample could help to provide a wider picture of participants' experiences, and in particular reasons for drop-out. This could be improved by increasing the flexibility of qualitative data collection methods, such as using telephone or electronic interviews, use of incentives, paying expenses for travel and time or using personally tailored request (e.g. "we are inviting you, as our records show that you had dropped out at the outset of the study, and we are interested to find out how we could have better supported you to complete the programme"). What is more, results from previous studies suggest that using a larger sample would be useful to obtain a range of views. In the current study one focus group with six participants was conducted, while similar studies which used qualitative research as a part of the process evaluation used on average two focus groups with six participants on average in each group (Jago et al., 2012; Wyatt, Lloyd, Creanor, &, Logan, 2011). To ensure that participants with a range of experiences were identified and recruited, purposeful rather than opportunistic sampling could be used to ensure that particular categories of participants (e.g. those who have dropped out from the study, those who managed to implement the 'full' swap) are represented during the discussion group to explore their unique or important perspective (Robinson, 2014). However, qualitative information would still represent the views of a limited number of participants.

It is not entirely understood why the theoretical model was not supported. As discussed in the section 5.4.3 it appears that they were problems with intervention evaluation (specificity of measures). Therefore the use of smartphone application (as discussed earlier) which would prompt users to input dietary information on a regular basis would help to better evaluate changes in dietary patterns. The use of such application would also enable to measure important constructs that were hypothesized to mediate the effect at more frequent intervals. This is important as insight from past work suggests that measurement of constructs related to motivation before and after the intervention, rather than during the

intervention, could have contributed to the lack of support for the specified model. A number of studies investigating SDT in relation to weight loss have found that motivation for weight loss measured early in the programme rather than prior to the programme beginning was predictive of weight loss (Williams et al., 1996, Webber, Tate, Ward, & Bowling, 2010) before the programme start was not predictive of weight loss. For example, in the study by Webber et al. (2010) autonomous motivation was highest in the week 4 of the 16 week programme and it remained high for those participants who were successful in achieving 5% weight loss, but declined for those who were not. Therefore it is possible that measuring motivation at different time points could have provided a more insight into the mechanism of the intervention.

5.4.6 Conclusions

The aim of this study was to test a novel theory-based intervention based on the model of successful month-long alcohol reduction or stop smoking campaigns. Results suggest that while Juicy June was an effective intervention to boost participants fruit intake, it was not an effective obesity prevention initiative as fruit and vegetable was simply added to the usual diet rather than being a potential substitution of a part of sugar-added products. Although the intervention was successful in increasing participants' autonomous motivation and social support, changes in these two constructs did not bring about dietary changes as predicted; therefore, the proposed theoretical model was not supported and the mechanism of the intervention action remains unclear. It appears that the theoretical model was not supported as motivation was measured for the wrong behaviour relative to the outcome or there were other mediators of change. It is also possible that it exerted its effect by increasing participants' self-efficacy and appeared to work as a 'trigger' from intention to action. Participants did not tend to engage actively with the Facebook community and did not tend to employ all behaviour change techniques they were provided with such as self-monitoring, which might suggest difficulties in translating behaviour change techniques to a different level. Although intervention was more appealing to healthy weight, healthy eating adults, it may be a positive finding as taking part in such a campaign could be seen as normal activity for everyone and may be more effective in recruiting other people including overweight with unhealthy diets to take part in it.

CHAPTER 6: General discussion

Obesity rates are growing at an alarming rate and new solutions are urgently needed (WHO, 2010). Many researchers recommend that lessons could be drawn from the tobacco experience for the organisation of more successful obesity control (Dorfman et al., 2004; Engelhard et al., 2009; Garson & Engelhard, 2007; Green et al., 2006; Mercer et al., 2003; West, 2007; Yach et al., 2003; Yach et al., 2005), as the reduction in smoking rates in the UK has been declared one of the greatest achievements of public health of the 20th century (Lewis et al., 2005). However, little is known about the mechanism of tobacco control action, that is, how these policies that are introduced on a global level affect individual level motivation and behaviour. Three studies included in this thesis aimed to explore motivational responses of individuals to tobacco and obesity control policies, with the use of SDT as a tool to help interpret the findings. In particular, this thesis aimed to establish whether applying this theory can help us understand individual responses to societal level interventions. A mixed method approach was taken. This final chapter aims to draw together the findings of these studies, demonstrate what similarities and differences between the two contexts have been identified, and outline possible practical implications for the more successful organisation of obesity policies (what types of policies might be most effective and how this could be achieved in practice).

6.1 Summary of findings and lessons learnt from the empirical studies for policy development

Results from Study 2 and 3 suggest that individuals high in motivation for behaviour change might be more likely to use services provided for them. Among Participants of Study 2, message acceptance among other factors was predicted by higher autonomous motivation for weight control. In Study 3, recruitment for the Juicy June intervention resulted in a sample of relatively healthy weight, healthy eating participants with high baseline autonomous motivation for weight control. This might suggest that these types of health messages resonate more with people who are already motivated to control their weight. There is some support for this notion in the literature. In a qualitative study of smokers with different levels of motivation to quitting by Uppal et al. (2013), only smokers who had high motivation to quit were willing to try stop smoking services, while smokers with low motivation were dismissive of these services. Similarly, it has been observed that people who already have healthier diets are more likely to use food labelling to guide their purchase (Campos et al., 2011). Therefore, if health promotion resonates more among individuals with an intrinsic motivation for change and motivation is a pre-determinant of for example message acceptance, the assumption that current approaches to health promotion are

useful for people not already motivated might be false (as motivation might be a pre-requisite for active engagement rather than such approaches increasing an individual's motivation, therefore a different approach might be needed for those with low levels of motivation).

Therefore motivating individuals to take control of their weight might be the first step for obesity control as otherwise individuals might not be likely to use the tools for promoting weight control that policies intended to put in place. According to SDT, one way of increasing people's motivation is to provide them with a meaningful rationale. Participants of Study 1 felt that their motivation to change their behaviour (i.e. quit smoking or lose weight) was low, despite being aware of the negative consequences of smoking or excess weight. While they agreed health is an important reason for a behaviour change, they felt it was not personally meaningful and not sufficiently powerful to promote internalization. They appeared to introject the rationale, but did not accept it as their own. SDT postulates that introjected regulation is a more controlled type of motivation; it would result in poorer outcomes compared with identified regulation. It is believed to be useful as a starting point for internalization of the behaviour and will result in short-term changes; however, it can have negative effects if it persists long term (Deci et al., 1994). This is consistent with failed weight loss or quit attempts among participants. None of the policy measures that have been introduced so far in the smoking or obesity context have provided participants with a meaningful rationale for changing their behaviour.

A meaningful rationale for weight control behaviours might be a message focusing on healthy lifestyle (rather than one warning against the health risks associated with excess weight) as such messages were found in a study of public perceptions of obesity-related public health media as most positive and motivating (Puhl, Peterson, & Luedicke, 2012). Such messages emphasizing benefits of a healthy lifestyle or losing weight might be also perceived as autonomy supportive rather than exerting pressure to behave in a certain way. Participants from Study 1 (Phase 2) felt the reason why they were not using services provided for them to help them control their weight such as referral to Weight Watchers through a GP surgery was because these services are not introduced in a way that conveys choice. What is more, such messages focusing on positive aspects might also be less likely to be dismissed due to the nature of optimistic bias. In this misperception of reality, individuals tend to be over-optimistic regarding the likelihood of positive events and underestimate the likelihood of negative events (Weinstein, 1998). Therefore if a health promotion campaign is developed that aims to help participants feel more energetic and

healthier, individuals might rate their chances of achieving the change as higher compared to others.

A meaningful rationale other than health could be provided to improve or strengthen current initiatives. For example, in June 2013 the Department for Health announced a new consistent approach to front of the pack food labelling which aims to help people make healthier choices and the majority of international food retailers have volunteered to adopt this scheme (DH, 2013). While labels are supposed to help consumers to select healthier options, a study of labelling has demonstrated that they were rarely used to guide purchase (Grunert et al., 2006). It is possible that adding information guiding food purchase would be beneficial (e.g. “a lot of people decide to use the labels to choose products that would help them to become more fit and active; so, a reason you might choose to follow the labelling is to become more active and healthy”), and might increase the number of consumers who use labels to guide their purchase. This approach would be focusing on positive aspects of healthy eating, and such an approach emphasising the positive aspects of healthy weight might be also helpful in conveying the message that a healthy lifestyle is something normal and attainable, as currently it is perceived as difficult to attain (Paquette, 2004) and such campaigns might help to encourage the perception that a healthy lifestyle is normal.

It is also possible that policies that provide a different rationale, which is not directly related to individuals’ personal health, but to a wider well-being (e.g. environmental degradation) may be more resonant. For example, for some people a meaningful reason for the adoption of a healthy diet could be emphasizing environmental preservation and sustainability, such that a regional healthy diet focussed on reducing food miles might not only contribute to better health, but also be environmentally friendly (Mackenbach, 2007). Such an approach could also help overcome barriers to lifestyle changes such as accessibility of ingredients and cultural difference in taste (as for example British consumers might not like the Mediterranean diet; Lloyd, Paisley & Mela, 1995; Papadaki & Scott, 2002; Roininen et al., 2001). Recently Denmark has developed and tested the New Nordic Diet which is designed to be sustainable, seasonal, organic and acceptable for all Danes. This diet is based on traditional regional foods such as oily fish, berries, wholegrain breads and good oils such as rapeseed oil (Bere & Brug, 2009) and is promoted by the production of recipe books, using celebrity chefs and organising cookery lessons (Clonan & Holdsworth, 2012). However, an evaluation of the acceptability of this diet using a randomized controlled intervention demonstrated that while it was acceptable in terms of hedonic eating qualities, it was less practical (time consuming and expensive) in everyday life compared with the standard and less healthy Danish diet (Micheelsen, Havn, Poulsen, Larsen, & Holm, 2014).

There might be a number of challenges to this approach (i.e. providing a meaningful rationale). One such challenge is that the reason for the lack of willingness to engage with the services provided arises due to lack of knowledge about how these services work, what support they provide or beliefs in their effectiveness rather than lack of a meaningful rationale for change. A number of studies examining smoking cessation behaviour have reported that smokers who are well informed about the safety and efficacy of nicotine medications or those who are more knowledgeable about the stop smoking services available, are more likely to use them (Basnal, Cummings, Hyland, & Giovino, 2004; Kasza et al., 2013; Roddy, Antoniak, Britton, Molyneux, & Lewis, 2006). In a prospective cohort study of 7436 adult smokers, those who used stop smoking medication were more likely to believe that medications make quitting easier and were more likely to maintain abstinence (Kasza et al., 2013). What is more, successful interventions have been designed challenging smokers' beliefs about tobacco dependence treatment (Christiansen, Reeder, Fiore, & Baker, 2014; Mooney, Babb, Jensen, & Hatsukami, 2005). For example, a sample of 245 low income smokers was involved in a short (10-15 mins) intervention to challenge their beliefs regarding the effectiveness of various quit methods. Intervention affected medication beliefs, the number of cigarettes smoked and the use of stop smoking services. Compared to controls, at follow up those assigned to the intervention group reported greater smoking reduction, believed medication can help lower cravings and were more likely to call the quitline; however, the follow up was short (one month) and data relied on self-report (Christiansen et al., 2014). Therefore it is possible that challenging individuals' thinking (e.g. interventions designed to change beliefs regarding what support services are available) might increase the use of obesity treatment services.

In Chapter 3 (Study 1) it was suggested that perceptions of a healthy weight could be influenced by the way media reports stories on obesity, combined with the findings from the second empirical study that show that the use of models who are morbidly obese might affect the interpretation of the risk among the overweight and obese people and result in underestimation of the risks posed by excess weight (i.e. believe risks start from a larger body size) compared with the same message delivered with no photo— other approaches may also be worth exploration. Therefore addressing the way obesity issues are reported in the media which has been shown to affect readers' perception (Ashmore, Friedman, Reichmann, Musante, 2008, Knobloch, Hastall, Zillmann, Callison, 2003), might not only help to shift the perception of what weight is normal, but also help to convey the message of what amount of excess weight is needed for the negative health consequences of excess weight to occur. This finding suggests a useful direction for policy leaders in developing and

implementing guidelines advocating the use of accurate image matches in media articles and health campaigns (Patterson & Hilton, 2013). Legislation could be enacted obliging news reporters to use for example people of an adequate BMI, use images which are not representing them in a stigmatising way (e.g. show them exercising). Such guidelines were recently produced in the US by the Rudd Centre for Food Policy and Research *Guidelines for Media Portrayals of Individuals Affected by Obesity* (Yale Rudd Centre, 2014). These guidelines focus on journalistic presentation of obesity to help media representatives portray obesity in a way that avoids stigma and pejorative portrayals. Although these guidelines are an important step in helping media to cover obesity related topics more accurately, these guidelines and their application could be improved. The guidelines could be extended to address specifically the size of the models depicted in photos accompanying journalistic articles and encourage more positive portrayal of a healthy lifestyle; for example, publish an article about active travel which emphasizes the benefits of cycling or walking to work such as low cost and not being independent from public transport. Uptake of such guidelines could be more widely promoted and encouraged or regulated (for example added to the journalists' code of ethics).

In Study 1, a key difference that emerged between smoking and obesity contexts was the perception of how the current environment supports healthy behaviours and the extent to which policies or the effects of these policies in the environment are 'visible'. Smokers appreciated tobacco control policies that aimed to re-shape the environment, especially smoke-free legislation, which although did not help them quit smoking, helped them to smoke less. Ex-smokers in addition appreciated measures such as a ban on tobacco vending machines which helped them to quit smoking or not to relapse by not providing cues to smoking. In contrast, individuals who find it difficult to control their weight felt that the way the current environment and financial environment in particular are structured, is undermining their healthy diet attempts. Unhealthy food is widely available and convenient (e.g. ready meals), it is heavily promoted and often cheaper than healthy options, suggesting that individuals who want to lead a healthy lifestyle struggle against an undermining environment. Participants from the focus group conducted as a part of Study 3 also felt that although Juicy June intervention was designed to provide a context in which they could experience social support and feel they were behaving in line with social norms, the environment that heavily promotes unhealthy products hindered their ability to introduce the full swap. This suggests that the approaches discussed in this and previous chapters would be strengthened if a comprehensive approach to obesity was introduced targeting a number of settings and behaviours at individual-level as well as environmental factors. Such a comprehensive and sustained approach has been shown to be effective in reducing

tobacco-related disease and deaths (Centers for Disease Control and Prevention, 2014; Mercer et al., 2003).

However, the introduction of a comprehensive approach to obesity combining the introduction of both active opportunities for people to engage in, as well as re-structuring the environment, does not agree with the current government ideology, which focuses obesity policy on non-regulatory interventions (HM Government, 2010). A recommendation to implement a more comprehensive approach that includes a number of measures, some of which eliminate choice, also does not agree with the Nuffield Council on Bioethics which recommends a stewardship model under which the state should not restrict people's freedom, but provide conditions under which people can lead a healthy lifestyle if they wish (Nuffield Council on Bioethics, 2007). A possible reason why the state focuses obesity policy on the downstream approach is that it is afraid of being accused of adopting nanny statism (Lang & Rayner, 2003), and as a result measures which are popular with the public are more likely to be introduced. However, the current study and results from the literature suggest that people might not be good at predicting what would work for them in terms of policy approach or how their preferences regarding policies would change (Promberger, 2008). For example, participants from Studies 1 and 2 felt that financial incentives would help them to address their behaviour, but research evidence suggests that incentives are unlikely to help people achieve long term changes (Cahill & Perera, 2008; Kane et al., 2004). People also tend to change their attitudes regarding a given policy once it is in place. For example, the introduction of the smoke-free legislation in Ireland initially received low social support (43%), but it increased significantly (83%) after its introduction (Fong et al., 2006). Also the success of such a non-regulatory approach that the current government supports relies on people's active engagement with such opportunities; however as shown before, the illusion of superiority might prevent people from engagement or they might not even recognise they are aimed at them. Therefore it questions whether politicians should base their decisions regarding policy implementation on public support for a given measure.

6.2 The benefits of taking a theoretical approach

Recently calls have been made to base research on theories as there are numerous advantages of applying theory to research; importantly, it allows for an understanding of the mechanism of change (Michie & Prestwich, 2010). Understanding the mechanism of tobacco control action (i.e. how these policies that are introduced on a global level affect individual level motivation and behaviour) might facilitate translation of the evidence across domains. The current thesis applied Self Determination theory as a tool to help interpret the

findings. SDT was selected as according to SDT people's motivation is a primary determinant of behaviour, thus behaviour change will be achieved through changing a person's motivation (Deci & Ryan, 1985b; Deci & Ryan, 1991), and the success of obesity policies is largely dependent upon the ability of these policies to motivate people to change their behaviour (Nuffield Council on Bioethics, 2007).

Applying SDT as a theoretical approach was useful as a means of understanding people's responses to public policy, and provided insight into the mechanisms through which policies (such as smoke-free legislation), or individual responses to media messages regarding obesity may operate. In the first two studies, SDT was used to interpret people's perception of the wider social environment influencing their motivation at a global level, and to explain how societal level factors could contribute to their level of autonomous or controlled motivation. Participants felt tobacco control and obesity measures are not introduced in an autonomy supportive way and exert pressure to behave in a certain way. For example, every time a smoker reaches for a cigarette, s/he is reminded about the negative consequences of smoking by graphic and text warning. Thus it is possible that smokers lose their own sense of value in the context of the communication style from the government that is perceived as controlling. Similarly, participants from Phase 2 felt the reason why they were not using services provided for them to help them control their weight such as referral to Weight Watchers through a GP surgery was because these services are not introduced in a way that conveys choice. In Study 1, SDT also was useful for explaining the responses to some policies. For example the smoke-free legislation was perceived positively by smokers, and exploring smokers' reasons behind this from an SDT perspective revealed that this may have been because it was introduced in such a way that smokers accepted the regulatory process as their own (i.e., they perceived the reasoning behind the legislation to coincide with their own values). For Study 2, the application of SDT helped to explore the impact of people's existing motivation towards weight control on their response to that message; the results demonstrated that individuals who were more autonomously motivated to control their weight, were more likely to perceive the message as personally relevant. This suggests that these types of messages resonate more with people who are already motivated to control their weight and so promoting autonomous motivation may be an important precursor to the impact of media articles. However, more longitudinal research that investigates the causal relationship between motivation and message relevance is needed.

Interpreting the study outcomes through the lens of SDT, the findings of Studies 1 and 2 suggest that characteristics of the social environment operating at a global level (i.e.,

policies, or media generated messages) can influence people's perceptions of whether their basic psychological needs are met or undermined (specifically, autonomy and relatedness in relation to weight loss activities). Further, the findings showed that this had the potential to impact their (individual-level) motivation for behaviour change. As such, drawing on past applied SDT research may provide a useful starting point for designing new policy interventions that better facilitate need support and the development of autonomy supportive motivation.

Although SDT has been refined over several decades of research and many efficacious clinical interventions have been developed based on its premises (e.g. Silva et al., 2010; Williams et al., 2006), the majority of research conducted within this framework has focused on proximal social context such as friends, teachers, doctors, while less attention has been paid to distal social context such as social norms or regulations (Deci & Ryan, 2014). Strategies such as minimizing judgment or acknowledging patients' perspective have been shown to increase people's autonomy, but they might not be achievable at a higher policy level (e.g. in a campaign-level intervention which people sign up to online). Thus, while there is potential that SDT may be able to influence people's motivation at a global, in addition to contextual and situational levels (Vallerand, 2000; Vallerand, & Ratelle, 2002), further work is needed to develop the strategies through which this can be achieved.

The third study in this thesis provides an example of how SDT can be used to inform the development of a societal-level intervention, to explore how the theory could be put into practice. According to SDT, the primary objective of interventions that aim to change behaviour is to promote the internalization of regulations so that individuals would accept the value or regulatory process as their own. Internalization is facilitated or inhibited by the degree to which social environments support an individual's basic needs for autonomy, competence and relatedness (Deci et al., 1994). Therefore, Juicy June focused on creating an autonomy supportive climate which was hypothesised to satisfy participants' basic needs. Use of theory allowed the selection of the component intervention techniques (e.g. behaviour change techniques that increased perceived competence) as according to SDT individuals' need satisfaction can be optimized by the creation of an autonomy-supportive climate which is characterised by the provision of three components: autonomy support (e.g. explaining rationale for activities), structure (e.g. providing tasks that are optimally challenging), and involvement (Deci & Ryan, 2000). A systematic process of design to target the determinants that had been suggested by prior research conducted as a part of this thesis was used, and other theoretical mediators as appropriate were integrated (i.e. not restricted to SDT as SDT can be useful to guide understanding of the behaviour change

processes, however no single theory may be able to encompass all determinants of behaviour change). In addition, research suggests that integrating SDT with techniques from different theories can further assist in promoting internalization of the behaviour (Fenner et al., 2013; Patrick & Williams, 2012); therefore, the intervention employed a number of behaviour change techniques associated with the increased effectiveness of interventions such as self-monitoring (Michie et al., 2009). Finally, although the intervention study (Juicy June) did not find the support for the specified mechanisms, it ruled out certain mechanisms (i.e. that the effects were not brought about by the changes in autonomous motivation).

Although theories of behaviour and theories of behaviour change might provide a useful way to understand why a particular behaviour occurs, and SDT has proven useful in interpreting and building on the studies presented in this thesis, such theories are numerous (a recent review has identified 82 theories of behaviour, Davis et al., 2014); researchers wishing to use a theory might find it difficult to select one (Tabak, Khoong, Chambers, & Brownson, 2012). Although intervention (Study 3) conducted as part of this thesis resulted in positive changes, these changes were not brought through the mechanism specified. It was hypothesised that in line with Vallerand Hierarchical Model of Intrinsic and Extrinsic Motivation (Vallerand, 2000; Vallerand & Ratelle, 2002) 'global' level social influences could influence motivation of people at either the 'contextual' or 'situational' levels. Top-down and bottom-up effects were expected, however the relationship between the global level social environment and individual motivation is complex and may need a wider perspective which might have not been captured in the current research. Therefore these influences need further testing, in particular whether global level effects can affect the situational outcome – i.e., 'jumping' over the contextual level.

In addition, results of the three empirical studies suggest that there were other determinants of behaviour change which were not addressed by the SDT, but which appeared to be important. Therefore research into motivational responses of individuals to obesity policies might need a wider perspective and include numerous theories/ constructs. Participants in Study 1 appeared to demonstrate a strong illusion of superiority (better than average effect) as they believed themselves to possess better skills and abilities and behave better than others. When making these self-other comparisons people overestimate their own characteristics, and deemphasize the attributes of others (Guenther & Alicke, 2010). This illusion of superiority is higher for events which are controllable, relatively benign and for which a stereotypical victim can be easily imagined (Harris, Griffin, & Murray, 2008) and

can therefore lower the impact of some health promotion approaches such as information campaigns. For example, the impact of a media campaign encouraging individuals to adopt a low salt diet can be reduced as people think they can control their diets, increased blood pressure is not a very serious illness and also individuals find it easy to form an image of a stereotypical person at risk (e.g. someone morbidly obese eating junk food). This message is unlikely to work even among people with high awareness of the risk such as people diagnosed with high blood pressure as awareness of a given condition does not reduce this better than average effect. For example, it has been shown that people with a recent episode of acute myocardial infarction have low adherence rates to medication (Butler et al., 2002) as patients feel they know how to control their blood pressure without medication (Gascón, Sánchez-Ortuño, Llor, Skidmore, & Saturno, 2004). Therefore, interventions which aim to change individual behaviour should take into account the influence of this illusion of superiority.

The proposed theoretical model specified in Study 3 was not supported and changes in dietary outcomes were not brought about by the increase in autonomous motivation and social support. It appears that for people who were already motivated to change their eating habits, the intervention helped them to make a decision to act. However, SDT might not account for the more volitional aspects of the motivation that underlie decisions made to act (SDT might be useful as a means to understand the 'why' of behavioural intentions -higher order motives). Therefore, interventions at any level (situational, contextual, global) may benefit from including strategies that address more immediate, situation-specific (i.e. volitional) aspects of eating regulation. Elements of the Health Action Process Approach (HAPA, Schwarzer, 1999), which suggests a distinction between the motivation and volition phase, could be incorporated, especially those related to the volition phase. According to the HAPA model, it could be predicted that variables related to self-regulation (such as self-monitoring) and self-efficacy would enable participants to make a transition from the motivation phase to volition phase. This appears important as low self-efficacy was reported by Participants from Study 1 as an important barrier to act.

Results from Study 1 and Study 3 also suggest that social support theories could have been incorporated to enhance our understanding of how social norms spread across networks and how these norms could be addressed. One such theory is social contagion of behaviour which assumes that phenomena spread across social networks (Smith & Christakis, 2008). Therefore for Juicy June it could have been assumed that if a large number of people took part in this intervention, those not motivated would also start to engage in healthy eating as according to this theory a behaviour spreads through exposure and becomes normalised.

This theory would help to examine whether Juicy June has the potential to be a successful fruit and vegetable promotion campaign for those not motivated for behaviour change, as those who are not yet contemplating the introduction of dietary changes, might start eating more fruit and vegetables as such behaviour would be turned into a social movement (Locher, 2002).

6.3 The benefits of using a mixed methods approach

This thesis incorporated the use of mixed methods which is defined as "research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry" (Tashakkori & Creswell, 2007, p.4). A mixed method approach was used as smoking, eating and physical activity behaviours are influenced by a number of individual as well as social level factors (including policies), and approaches combining qualitative and quantitative studies might help to better understand this multi-level perspective and provide real-life understanding of the phenomena studied. Mixed methods is also better than using either qualitative or quantitative approaches alone at studying complex phenomena as it enables the gathering of evidence based on the nature of the phenomena (i.e. to understand why a particular phenomenon occurs qualitative methods are used, while to measure patterns of association quantitative methodology is used). In addition, a mixed methods approach was adopted in order to maximize the strengths and minimize the weaknesses of using both qualitative and quantitative approaches (Creswell et al., 2011)- as this increased methodological sophistication can help to better understand health problems, in particular complicated health problems (Plano Clark, 2010).

As the definition of mixed methods research implies, conducting mixed method studies is not simply collecting qualitative and quantitative data, but integration or a combination of the two types of data (Tashakkori & Creswell, 2007) as data integration offers insights that might not be offered by quantitative or qualitative findings alone (Bryman, 2007). In the current work, qualitative and quantitative approaches were linked in two ways: the outcomes of the qualitative study drove the focus and design (including selection of primary outcomes) of two subsequent quantitative studies. Second, qualitative methods were embedded in the intervention study, where information from a focus group was used to help understand how participants experienced the intervention and also to interpret the results of the intervention. Thus, using a mixed methods approach enabled both the testing of the theoretical mechanism of the intervention, as well as enhancing understanding of the individual experiences of participants.

A mixed methods approach is not without its flaws. One limitation is the challenge posed by the interpretation of conflicting results (Johnson & Onwuegbuzie, 2004). In the current thesis, this was the case where a quantitative study (Study 2) did not find support for the issues raised by participants in Study 1. While participants in Study 1 felt that images of morbidly obese adults accompanying media health messages about obesity made them perceive the message as personally relevant as they perceived themselves to be considerably slimmer than the pictured individuals, this finding was not confirmed in the subsequent quantitative survey. In that study, approximately 50% of overweight and obese participants felt the message was not personally relevant and the message acceptance was not predicted by the size of the model accompanying the message. It is possible that the participants who took part in Studies 1 and 2 might not have been comparable, despite appearing to represent a similar group (overweight people who find it difficult to control their weight)— therefore their response to the message differed. It is also possible that the findings were not conflicting, but that qualitative and quantitative methods might "tap different domains of knowing" (Mathison, 1988, p.14).

Another possible reason why the qualitative findings were not upheld is the difference in how images of morbidly obese adults used in media articles were presented to participants in these two studies. In Study 1 participants were presented with three media articles (Appendix 3.4) and asked to scan them briefly, therefore they might have been more likely to guess the intended meaning of the message from the photo (Filippatou & Pumfrey, 1996); while in Study 2, participants were asked to read the article with a view to giving feedback on it later, therefore they might have placed less importance on the photo. Alternatively, interview participants may have discussed more private views compared with questionnaires where they reflected their more public views or more pragmatic views which would not be judged as the survey was anonymous (even though on the surface the interview and questionnaire might be asking exactly the same questions). Another possible reason for this difference in findings was the need to maintain self-serving assessment i.e. to regain a favourable image of the self (Sedikides & Strube, 1997) among participants of Study 1. Participants of the individual interviews were discussing causes of obesity and their failed loss attempts, therefore their self-evaluation might have been undermined and they may have experienced a need to regain favourable self-evaluation (Pyszczynski, Greenberg, & LaPrelle, 1985); one way of doing so was to focus on pictures of morbidly obese individuals and emphasise that they perceived themselves to be considerably slimmer. When conflicting findings arise in mixed methods research a strategy of resolving differences should be considered (Creswell et al., 2011). The differences between Study 1

and Study 2 in terms of media articles presentation (e.g. whether models were shown walking or seating) were brought together and reviewed, and a conclusion was made that points raised by participants in Study 1 were not confirmed in Study 2 due to the Study 2 design. Therefore, these conflicting findings might add depth to the study or provide corroborative evidence and help to understand the process (Buber, Gadner, & Richards, 2004).

Another limitation for mixed methods studies that use a sequential design (one phase informing the next) is selecting which finding to follow up in the next phase (Bazeley, 2002). It cannot be ruled out that if a different theme identified in Study 1 was followed up, a different, and potentially more effective intervention could have been designed. It is also possible that a range of factors that emerged in Study 1 that participants felt hindered them from taking action were narratives that people tell to justify their behaviour, but in reality a host of different factors such as environmental constrains had a stronger influence on their behaviour. However, this is not a major limitation as other avenues can still be pursued in future.

Another weakness of using mixed methods is that the researcher conducting the study had to use multiple methods of data analysis (Johnson & Onwuegbuzie, 2004) and some compromises in terms of approaches used have been made. Data collected during interviews were analysed using Thematic Analysis as it requires less advanced theoretical and technical knowledge compared with Interpretative Phenomenological Analysis (IPA) or Grounded Theory (GT) (Larkin, Watts & Clifton, 2006). It is possible that with the use of a different qualitative data analysis technique a deeper insight into accounts of individuals in response to legislation could have been gained. However, the use of Thematic Analysis in contrast to for example IPA helped to avoid 'epistemological clash' where it is diffiuclt to integrate conflicting ontological and epistemological positions of qualitative and quantitative data (Bryman, 2007).

6.4 Future research directions

Four possible avenues for future studies emerged that I consider important for obesity policy. The first line of research pertains to the role of motivation for behaviour change and engagement with opportunities provided to help individuals to control their weight. Findings from the current thesis indicate that tobacco control and obesity policy measures are received more positively among those who are already motivated to quit smoking or change their diet and/or physical activity habits and these individuals are more likely to take

advantage of opportunities provided for them. This was evidenced in two approaches, one related to media information where individuals with high pre-existing motivation towards weight control were more likely to accept the message, and one related to community health promotion initiatives where healthy weight healthy eating individuals were more likely to take part. Evidence from alcohol abstinence campaigns regarding whether this approach is able to recruit at-risk people is mixed. For example, among participants who took part in Australian Febfast, compared with the general Australian population, participants of Febfast were consuming alcohol more often and in greater amounts (FebFast, 2011), suggesting that the campaign was successful in recruiting at-risk drinkers. In contrast, recruitment for the UK based Dry January campaign resulted in a diverse sample including both light and moderate drinkers, however such an approach was not successful in engaging the most at-risk drinkers (Dry January, 2013). Therefore more research is needed that investigates why those differences arose and why Febfast was more successful at allowing at risk drinkers to recognise themselves as such and sign up for the challenge. It is also possible that such universal recruitment approaches might not be transferable to the food and physical activity domain and a more targeted approach that focuses on those at risk might be needed.

In addition, work presented in this thesis has consistently demonstrated that individuals exhibit a strong illusion of superiority and this might prevent people from using the tools for promoting weight control that policies put in place such as food labelling. Therefore, other types of approach should be researched, where the effectiveness does not rely on motivation but instead researches potential methods for lowering or overcoming the illusion of superiority. Examples of how this could be attempted include changing default menu options so that restaurants would be serving their main meals with healthier side orders rather than clients asking for the healthier option. Such changes to default options have been successfully introduced in the healthcare setting (e.g. influenza vaccination for all health care workers; Halpern, Ubel, & Asch, 2007), organ donation (Rithalia, McDaid, Suekarran, Myers, & Sowden, 2009) and finance area (e.g. retirement savings; Madrian & Shea, 2011) and findings suggest that people rarely change the default option. However, this has been little studied in the food domain and available evidence concerns children and adolescent restaurant food choices and suggests that such an approach is able to improve the healthiness of menu choices (Anzman-Frasca et al., 2014; McCluskey, Mittelhammer, & Asiseh, 2012). Therefore strategies which aim to provide a healthy default option are worth exploring among adult consumers.

The application of conditions that aim to create an autonomy-supportive climate at a wider-social level warrants further investigation. Key components of autonomy supportive

environments include: language conveying choice and agency (Williams, Cox, Kouides, & Deci, 1999), provision of a meaningful rationale or the use of language that acknowledges an individual's feeling and perspective (Deci et al., 1994). For example, the impact of autonomy supportive messages rather than warnings on cigarette packs could be investigated (e.g. *Quitting smoking might seem quite a lot to deal with. It is your choice whether you decide to quit, but we are here to help. Remember there are different options that you might find helpful*). Another approach could involve presenting a rationale for introducing different obesity policy measures such as higher tax on foods high in saturated fat. For example, the introduction of such a tax could be accompanied by a televised media campaign focusing on a rationale for introducing such a measure (e.g. that such products do not offer much nutritional value and that the money raised as a result of this higher tax would be used to subsidize fruit and vegetables), and the impact on the presence of this rationale on an individual's support for the measures, and ultimately their motivation to engage with the policy (and whether it would moderate their fat intake); if adverts were confined to part of the UK only, a comparative trial could be conducted to assess people's responses in the absence of any rationale. If policies are introduced in a more autonomy supportive way and an autonomy supportive climate is successfully created, research could explore whether that would increase subsequent engagement. It might be possible that interventions which are introduced in a way that acknowledges an individual's perspective or gives people a meaningful rationale might reduce the illusion of superiority and as a result increase the number of people who think the message applies to them personally.

A final area of future work is investigation into the mechanism through which environmental measures exert their effect on an individual. The results of Study 1 suggest that this effect might be in part mediated by an increase in competence (self-efficacy), but this relationship needs to be confirmed in a study with a more generalizable sample size. The generation of data on the mechanisms through which policies influence behaviour, and which approaches may be useful in targeting which mediators of change would help to facilitate a more strategic process of design incorporating theoretically informed components as recommended by the updated Medical Research Council guidance on evaluations of complex interventions (Craig et al., 2013). The evaluation of the Juicy June intervention emphasized the importance of measuring changes in the proposed mechanism and variables that are predicted to bring about effects, as by demonstrating that positive outcomes were not achieved through the predicted theoretical model (i.e., fostering stronger autonomous motivation), there is greater potential for future development and translation of findings to other studies. By acknowledging that a significant, sustained increase in autonomous motivation was not brought about by the intervention, the path is clear to

investigate whether a better outcome could be achieved through other behaviour change strategies, and if so, whether the long-term impact of the intervention could thus be further enhanced. Similarly, exploring through what other mechanisms the positive effects were brought about could help to inform the translation of these findings to similar interventions in other settings. Application of other theoretical perspectives could help to understand the mechanisms through which interventions produce change. Results from the current study suggest that the use of Facebook was not a useful source of social support, however future work could explore whether the Internet could be harnessed to foster social support by for example providing a different rationale for change (doing it for charity) or increasing media recognition. A useful framework to explore this notion could be the Social Influence Model of Consumer Participation in Virtual Communities (Dholakia, Bagozzi, & Pearo, 2004) which emphasizes the role of group norms and social identity which emerged as important determinants in the current study. Another useful approach in this regard could be the Theory of Normative Social Behaviour (Rimal & Real, 2005) which emphasizes the role of perceived social norms and group identity (whether people feel similar to other group members and whether they aspire to belong to this group).

6.5 Limitations

There are a number of limitations to this thesis that should be acknowledged. Firstly, results are based on responses of individuals who appear to be aware of their weight status and motivated to change their dietary habits. These adults might have different views from adults who are overweight, but are not aware that their weight is classified outside the healthy range. A number of findings are based on results from qualitative studies (Study 1) which cannot be generalised without confirming that they are prevalent among a wider audience. Current research has shown that not all points raised by participants in a qualitative study were subsequently confirmed in a quantitative study (i.e. type of a photo accompanying message about negative health consequences did not affect perceiving the message as personally relevant). It is also possible that factors which according to participants of Study 1 affected their motivation to weight control, namely low perceived motivation for behaviour change, low self-efficacy and low perceived social support for healthy eating, were not in fact important barriers to behaviour change; these are narratives that people tell when justifying their status (Klein & Kunda, 1993). Ideally, the plausibility of this hypothesis should have been confirmed in a quantitative study before delivering an intervention.

While Study 1 identified the illusion of superiority (better than average effect) as an important factor that might affect people's responses to obesity policies, the design of the

next two studies did not take into account the possible strong influence of this phenomenon and its relationship with motivation for behaviour change. Therefore, it is possible that many individuals who saw adverts recruiting participants did not feel the intervention was relevant to them, and among those who took part some could have not followed the study protocol (e.g. use Juicy June calendar) as they felt they did not need it. Investigation of this illusion could have also allowed a deeper insight into findings of Study 3, however it was not measured.

When designing Juicy June intervention, although a systematic process of design to target the determinants that had been suggested by prior research conducted as a part of this thesis was used, and intervention integrated other theoretical mediators as appropriate (i.e. was not restricted to SDT), the current study might have been more useful by incorporating a strategic process of design and theoretically informed components rather than aiming to imitate examples of campaign-based interventions. However, the lack of systematic process of design was in large part attributed to the lack of robust evaluations of policy level interventions that seek to identify the key components responsible for positive effects. Finally, although research conducted for this thesis was theory based as there are numerous advantages of applying theory to research (Michie & Prestwich, 2010), the proposed theoretical model for the intervention was not supported. Intervention results in significant improvements in dietary outcomes, however the theoretical mechanisms of this effect remain unclear.

6.6 Conclusions

The aim of the current thesis was to explore whether it is possible to translate success from the smoking domain to obesity, using SDT as a theoretical framework to explore the mechanisms of policy level factors' influence on individual motivation. This was explored in three studies that used a mixed methods approach. The first qualitative study demonstrated a number of similarities and differences between smoking and behaviours associated with weight control (eating and physical activity) with respect to people's views of policy intervention. Applying SDT highlighted the issue of perceived control (i.e. the extent to which people act because they feel pressured to behave in a certain way) in people's attitudes towards tobacco and obesity policies. The results suggest that policy measures designed to increase smokers' motivation to quit or to help them quit smoking such as warning labels, are not perceived by smokers as motivating them or helping them to change their behaviour. Individuals who find it difficult to control their weight felt that the government has an important role in reducing the rates of obesity, however did not agree with the legitimacy of

some more restrictive obesity measures, suggesting lack of public readiness in the obesity context for a dramatic policy shift.

The rationale for change provided by the state or health service (i.e. to improve health outcomes) was appreciated by both groups, but was not perceived as personally important or meaningful. These findings taken together suggest that smokers and people who find it difficult to control their weight, experience the current social policy climate as controlling or pressuring them to behave in a certain way. According to SDT, experiencing the policy climate as controlling is likely to result in more controlled forms of extrinsic motivation (whether external regulation, engaging in an activity to avoid penalties, or attaining an end outcome of the activity that is separate from the behaviour itself, or introjected regulation, engaging in an activity to obtain contingent self-worth or out of sense of obligation or guilt, where behaviour is less likely to be maintained; Gillison, Osborns, Standage, & Skevington, 2011; Ryan, & Deci, 2000c). This is supported by smokers' and dieters' failed quit and weight loss attempts. One significant exception was smoke-free legislation that was introduced in such a way that it gave smokers a powerful and meaningful rationale as to why smokers needed to change their behaviour (i.e. to protect non-smokers from passive smoking) which smokers subscribed to. This led to self-determined regulation of behaviour which might explain high compliance with this legislation. Thus a more supportive and encouraging communicating style from the government might lead to more intrinsic motivation and maintained behaviour change.

The results of two quantitative studies within this thesis suggest that autonomous motivation for weight control is associated with identification with health messages (Study 2) and/or adoption of social interventions (Study 3). Therefore, these findings confirm the important role of increasing awareness and acceptance of health risk as a precursor to benefiting from health promotion services (Sherman, Nelson, & Steele, 2000; van 't Riet & Ruiter, 2103). As such, introducing policies that do not require motivation for behaviour change but aim to re-shape the social environment would promote individuals' behaviour change. SDT might be useful in this regard as it is well established at describing how environments (e.g. policy initiative) can foster or undermine motivation for behaviour change. In order to foster motivation basic psychological needs- the need for autonomy, competence and relatedness- have to be supported. This thesis has explored whether some of the needs can be supported at a wider social level- for example Juicy June aimed to create support for competence by introducing an approach that encouraged participants to introduce a small step approach to create an environment that supports health behaviours rather than undermines them.

SDT offered a useful framework as a means of understanding people's responses to public policy as it provided insights into the complex interrelationships between basic need satisfaction, regulation at various levels (e.g. situational motivation), and factors affecting motivation at different levels. Applying SDT helped to specify some practical implications for the organisation of more successful obesity policy (i.e. how an autonomy supportive climate might be facilitated). However, results emphasized difficulties and challenges in implementing strategies which stem from SDT that translate across different hierarchical levels of influence (i.e. global – contextual – situational – as per Vallerand's HMIEM; Vallerand, 2000; Vallerand & Ratelle, 2002). While behaviour change techniques and conditions that are implemented to create an autonomy supportive climate appear to be effective at a more local level (such as a school or workplace; Chatzisarantis & Hagger, 2009; Cheon et al., 2012; Su & Reeve, 2011), different techniques might be needed when introduced remotely. For higher level interventions one such technique could be extensive uptake or extensive media coverage which creates the perception of taking part in 'something bigger'. Finally, the intervention demonstrated that a small step approach (similar to those used in alcohol or smoking) might be a useful intervention to boost fruit and vegetable intake; however, it appears that its effectiveness could be increased if it was part of a comprehensive approach, similar to smoking, where different factors and different levels are addressed.

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APPENDICES

Appendix 2.1 Similarities between smoking and eating behaviour/ physical activity.

	Smoking	Eating behavioural factors	Physical inactivity/ sedentary lifestyle
Overall high prevalence rates	21% of adults continue to smoke in England (ASH, 2013).	In 2011, in England, 76% of men and 71% of women were not meeting the recommended daily fruit and vegetable intake (The Health and Social Care Information Centre, 2013).	In 2011, in England, 59% of men and 69% of women were not meeting the physical activity guidelines (The Health and Social Care Information Centre, 2013).
Addictive properties	Nicotine is highly addictive (Britton et al., 2000).	Drugs and food activate similar common reward circuitry in the brain and both drug addiction and eating behaviour involve learned habits and preferences, which are reinforced by powerful and repetitive rewards, suggesting that individuals might be vulnerable to developing a food addiction (Adam & Epel, 2007; Kalra & Kalra, 2004; Volkow & Wise, 2005)	N/A

	Smoking	Eating behavioural factors	Physical inactivity/ sedentary lifestyle
High economic costs	In the UK in 2005/06, the direct costs of smoking were £5.2 billion, while the societal costs of smoking were nearly £14 billion per annum (ASH, 2010).	It is difficult to estimate costs of unhealthy diets, however direct costs of obesity were in 2003/2004 £3.2 billion (Allender & Rayner, 2007), while total costs in 2002 nearly £7 billion for England only (Foresight, 2007).	Based upon five health conditions specifically linked to inactivity (stroke, coronary heart disease, diabetes, breast cancer and colorectal cancer), it has been estimated that the direct cost of physical inactivity to the NHS across the UK is £1.06 billion (DH, 2011e).
Limited effectiveness of clinical interventions	In the case of smoking, those who attempt to quit will mostly relapse within a year (West, McEwen, Bolling, & Owen, 2001).	Long-term weight loss after diet is only partially sustained, with weight regain after one year of approximately 50% across the majority of studies (Curioni & Lourenco, 2005).	Although trials of physical activity promotion delivered within primary care are effective in the short-term, their effectiveness in the long-term is limited (Orrow, Kinmonth, Sanderson, & Sutton, 2012).

	Smoking	Eating behavioural factors	Physical inactivity/ sedentary lifestyle
Higher prevalence rates among lower socioeconomic groups	In 2012, 33% of men and 32% of women in manual and routine occupations were smokers compared with 16% of men and 12 % of women in managerial and professional occupations (ONS, 2012).	In England, in 2011, lowest consumption of fruit and vegetables was associated with lowest income quintile (only 8% of men and 19% of women met the recommended 5 portions compared with 32% of men and 37% of women in the higher quintile) (The Health and Social Care Information Centre, 2013).	In England in 2008, men and women from the lowest income quintile were the most inactive among all income groups (46% of men and 45% of women had very low activity levels compared with 23% of men and 28% of women in the highest quintile) (British Heart Foundation, 2012).
Major health consequences	Tobacco, unhealthy diets and physical inactivity represent three out of the five main risk factors for non-communicable disease which accounts for 60% of premature deaths worldwide (WHO, 2004).		
Aim of control policies	Both tobacco and obesity control aim at influencing complex behaviours (Mercer et al., 2005).		
Complex causes	Smoking, eating and physical activity are influenced by a number of economic, social and environmental factors such as heavy marketing (Engelhard et al., 2009; Mercer et al., 2005).		

Appendix 2.2 Differences between smoking and eating behaviour/ physical activity.

	Smoking	Eating behavioural factors	Physical inactivity/ sedentary lifestyle
Food and physical activity essential to life	Smoking is not essential to life.	Food is essential to life (Brownell & Warner, 2009), and people need to eat nutrients (in moderation), which are perceived unhealthy such as saturated fat for healthy functioning (Engelhard et al., 2009)	Physical activity is essential to life (Brownell & Warner, 2009).
Age at which the problem begins	Most smokers begin smoking in adolescence (Kandel & Logan, 1984)	There are strong intra-uterine influences on obesity (Gillman, Rifas-Shiman, Berkey, Field, & Colditz, 2003) and children's early diet has long-term health consequences (Nuffield Council on Bioethics, 2007),	Children's early physical activity and sedentary behaviours have long-term health consequences (Rey-Lopez, Vicente-Rodríguez, Biosca, & Moreno, 2008; Sallis, Prochaska, & Taylor, 2000)
Awareness of health risks	48 % of respondents in the 'Smoking-related behaviour and attitudes, 2005' survey, mentioned smoking as the main cause of premature death, suggesting high awareness of the ill effects of smoking (Taylor, Lader, Bryant, Keyse, & Joloza, 2006).	In the study by Wardle et al. (2001) only 17% of men and 14% of women acknowledge being overweight as a risk factor for bowel cancer, suggesting that there is no widespread awareness that obesity poses a health risk.	In England in 2007, 27% of men and 29% of women felt they knew current recommendation for physical activity; however, less than 10% could specify the minimum recommended levels (The Health and Social Care Information Centre, 2013).
Underage sales restrictions	Selling tobacco to children is illegal (Brownell & Warner, 2009).	Although restrictions on sale of unhealthy products to minors could be an effective obesity strategy, they are unlikely to be introduced (Pomeranz, 2011).	N/A

	Smoking	Eating behavioural factors	Physical inactivity/ sedentary lifestyle
Immediate gratifying aspects	Tobacco and food offer immediate gratification.		Physical activity is often associated with some inconvenience such as going to a fitness facility (Green et al., 2006)
Addictive properties of tobacco	Addictive properties of tobacco were recognised many years ago, whereas research on food and addiction is only now maturing (Brownell & Warner, 2009)		N/A
Recognition of the problem at a policy level	First calls to address smoking by the introduction of public health policies were made more than 50 years ago (ASH, 2002).	Obesity and its underlying causes (overweight and lack of physical activity) were identified as important public health issues by the WHO 20 years ago (James, 2008).	
Goal of control policies	The goal of tobacco control policies is to eliminate one product- tobacco	The goal of obesity policies is more complex and they aim to encourage people to engage in more physical activity and improve the quality of their diet.	
Harmful effects to others	Smoking is harmful to those exposed to second-hand smoke. The harm of tobacco to non-smokers helped mobilize public support for smoke-free law legislation (Green et al., 2006).	Overeating or low level of physical activity is not directly harming those around	

Appendix 2.3 Key partners in formulating and implementing policy agenda

Key partners in formulating and implementing policy agenda (McKinnon et al., 2009)

Knowledge generation	Knowledge implementation
International agencies e.g. WHO	Knowledge generation partners
Communities	Media
Professional and voluntary organisations in the health sciences/communities (e.g. Weight Concern)	Food and drink industry
Non-profit organisations that sponsor and/or conduct research	Major corporations not related to the food and drink industry
the Office of the Deputy Prime Minister (promoting urban spaces for healthy travel and recreational activities),	Groups with complementary aims
Other government agencies (e.g. Department of Education). For example, in the government at least seven separate departments should be involved in obesity tackling: • Department of Health (obesity as a public health issue), • Department of Culture, Media and Sport (sport and physical activity promotion, regulation of the media, especially food advertising), • Department for Environment, Food and Rural Affairs (farming and food production), • Department of Education and Skills (ensuring children receive physical education at school, healthy food at schools), • Department for Transport (appropriate transport policies), • Department of Trade and Industry (food manufacturing and retail industries),	Groups with experience in dissemination of public health messages (e.g. ASH)

• Department for Work and Pensions (changing work patterns).	

Appendix 2.4 Agreed domains representing constructs relating to behaviour change.

DOMAIN		CONSTRUCTS
Fishbein et al., 2001	**Michie et al., 2005**	
Intention	Goals and motivation	Intrinsic motivation; Intention (stability of intention/certainty of intention); Goals (autonomous, controlled); Goal target/setting; Goal priority; Commitment; Distal and proximal goals; Transtheoretical model and stages of change
Skills	Skills	Skills; Competence/ability/skill assessment; Coping strategies; Interpersonal skills; Practice/skills development
Self-standards	Social/ professional role and identity	Social/group norms; Identity; Group/social identity; Professional identity/boundaries/role; Alienation/organisational commitment
Self-efficacy	Beliefs about capabilities	Self-efficacy; Perceived competence; Control of behaviour and material and social environment; Self-esteem; Perceived behavioural control; Optimism/pessimism; Self-confidence/professional confidence; Empowerment
Anticipated outcomes/Attitude	Beliefs about consequences	Attitudes; Outcome expectancies; Anticipated regret; Appraisal/evaluation/review; Consequents; Contingencies; Reinforcement/punishment/consequences; Unrealistic optimism; Incentives/rewards; Beliefs; Salient events/sensitisation/critical incidents; Characteristics of outcome expectancies– physical, social, emotional; Sanctions/rewards (proximal/distal, valued/not valued, probable/improbable, salient/not salient, perceived risk/threat)
Environmental constraints	Environmental context and resources	Person-environment interaction; Resources/material resources (availability and management); Environmental stressors; Knowledge of task environment

Appendix 2.4 Cont. List of agreed domains representing constructs relating to behaviour change.

DOMAIN Fishbein et al., 2001	DOMAIN Michie et al., 2005	CONSTRUCTS
Norms	Social influences	Social support (personal/professional/organisational, intra/I interpersonal, society/community); Social/group norms subjective, descriptive, injunctive norms; Group conformity; Social pressure; Social comparisons; Learning and modelling; Identity (group/social identity); Organisational development; Leadership; Team working; Organisational climate/culture; Power/hierarchy; Professional boundaries/roles; Management commitment; Supervision; Inter-group conflict; Champions; Identity; group/social identity; Organisational commitment/alienation; Feedback; Conflict—competing demands, conflicting roles; Change management; Crew resource management; Negotiation
	Knowledge	Knowledge; Knowledge about condition/scientific rationale; Schemas/mindsets/illness representations; Procedural knowledge
	Memory, attention, and decision processes	Memory; Attention; Attention control; Decision making
	Emotion	Stress; Fear; Affect; Anticipated regret; Burn-out; Positive/negative affect; Cognitive overload/tiredness; Threat; Anxiety/depression
	Behavioural regulation	Implementation intention; Self-monitoring; Goal/target setting; Action planning; Goal priority; Barriers and facilitators; Generating alternatives; Feedback; Moderators of intention-behaviour gap; Project management
	Nature of the behaviours	Breaking habit; Routine/automatic/habit; Direct experience/past behaviour; Representation of tasks; Stages of change model

Appendix 3.1 Full interview schedule used in Study 1 (Phase 1)

I. Intro and breaking the ice

1. Tell me how long have you been smoking for?
2. In your view, could you tell me briefly why people start smoking and why they keep smoking?
3. Have you ever tried quitting?

II. Experience of quitting

4. How you have tried to quit before?
5. If your quit attempts weren't successful, why do you think this was?
6. What do you think would help you quit smoking?
7. When have you tried to quit before, did you make any changes to the places where you lived and worked to make it easier for you not to relapse?

III. Attitudes towards tobacco control policy

8. Over the last 10 years, the number of smokers in England had significantly dropped *[show graph]* In the second half of the 1990s, around 27% of people living in the UK were smokers, while now it is around 22%. Why do you think this is?
9. The next questions are about some of the ways that the government is trying to reduce the number of smokers and how well you think they work/ would work. In the recent years a number of tobacco control policies have been introduced. By tobacco control policies I mean things that the Government does to reduce the numbers of smokers. Could you name any that you are aware of?

If not I will give you some examples…

10. In your opinion, how are these policies affecting smokers?

(reducing the number of smokers, reducing their autonomy/ freedom, helping them to quit, helping them realise how smoking affects them/people around them etc.)

11. Have those policies affected your motivation for quitting smoking?
12. In July 2007, the smokefree law was introduced in England and all enclosed public spaces went smoke free. Do you remember what were you thinking about this ban before it was introduced? (*Were you in favour? How did you think smokers in general would react?)* What do you think now?
13. Do you think it affected your smoking behaviour and/or attitudes in any way?

(*encouraged participant to quit; participant decided that their homes should also be smoke free, changed their attitudes towards acceptability of smoking etc.)*

IV. Policy challenges

14. What do you think are the main challenges to these policies being effective?

15. Why do you think government is introducing such measures? *Do you think government is interfering, helping, nannying?*

16. How much of a role do you think the government should take in trying to reduce the number of smokers?

17. Do these tobacco control policies require people to make sacrifices? [*e.g. like for example by costing them money or that they have to go out for a cigarette]*

18. Do you think that people are willing to sacrifice personal freedom to support policies that aim at reducing smoking rates?

19. The Government is planning future tobacco control measures such as plain packaging *[show picture*] What do you think about such measures?

20. How would these policies affect your motivation for quitting smoking?

21. Earlier you said that… *(give an example of what changes participant made to the places where he/she lived and worked to make it easier not to slip e.g. smoke- free home)*. On that basis that this idea may work for other people too, is there any way that this could be done on a larger scale/ what other environments (i.e., places that you spend time in) that you personally aren't in control of could this be expanded to?

Is this something that could be scaled up? How? *(encourage participants to talk about their ideas, beliefs and attitudes regarding smoking and smoking quit attempts).*

22. Do you think tobacco control policies mirror what you did to try and help yourself in any way?

V. Interview closing

23. Would you like to add anything else?

24. Do you have any questions you would like to ask?

Appendix 3.2 Additional materials used in Study 1 (Phase 1)

Tobacco control policies that have been implemented or will be implemented in England (in chronological order):

Tobacco control policy	Year introduced
Public education- marketing and communication programmes	1998
Tar yield to no more than 12mg per cigarette from 1998 further reduced to 10mg per cigarette from 2004	1998 2004
Creation of NHS Stop Smoking Services	1999
NRT medicines become widely available	2001
Increased health warning on cigarette packs to ⅓ of the main pack faces	2002
Tobacco policy programme established for each region of England	2003
Misleading 'mild' branding banned	2003
Prohibition of most tobacco advertising and sponsorship	2003/2004
Public Service Agreements	2004
Implementation of the Quality and Outcomes Framework	2004
WHO FCTC ratified by the UK	2006
VAT on nicotine replacement therapy reduced to 5% for over the counter medicines	2007
Smokefree law in England	2007
The age of purchase of cigarettes raised from 16 to 18	2007
Picture warnings on all tobacco packaging	2008
A law to give judges the power to ban a retailer from selling tobacco if a retailer was found guilty of selling tobacco to under 18s	2008
HM Customs and UK Border Agency join forces to tackle smuggling	2008
Additional resources for the Local Authority Coordinators of Regulatory Services (LACORS)	2009
The ban on tobacco vending machines	2011
Ban on the display of tobacco products at the point of sale for larger retailers for smaller retailers	2012 2015

Appendix 3.3 Demographic questionnaire used in Study 1 (Phase 2)

We would like to ask you a few questions about yourself to help us to select participants for the study. You will not be asked for your name and all your answers will be confidential.

1. What is your age? _____
2. (gender) What is your gender? Male / Female
3. (ethnic origin) Which of these best describes your ethnic group?

White	**Mixed**	**Asian or Asian British**	**Black or Black British**	**Chinese/ other**
White British	White and Black Caribbean	Indian	Black Caribbean	Chinese
White Irish	White and Black African	Pakistani	Black African	Other (please specify)
Any other White background	White and Asian	Bangladeshi	Any other Black background	
	Any other Mixed background	Any other Asian background		

4. What is the highest level of education you have obtained:
    a. No formal qualifications
    b. O level or GCSE
    c. ONC/BTEC
    d. A-levels or highers
    e. Higher education qualification below degree level
    f. Degree or higher degree
    g. Other (please specify)…..
5. Are you currently:
    a. Employed full-time
    b. Employed part-time
    c. Unemployed
    d. Self-employed
    e. Full-time homemaker
    f. Retired
    g. Student
    h. Disabled or too ill to work
6. How many years have you been living in the UK? ___
7. Do you know what is your height? Feet_____ inches_____ or cm_____
8. Do you know what is your weight? St_____ lb_____ or kg_____

9. Do you know what is your waist circumference? (to measure your waist circumference, place a tape around your bare abdomen just above your hip bone. Be sure that the tape is snug, but does not compress your skin and is parallel to the floor. Relax, exhale, and measure your waist.) inches_____ or cm_____
10. Are you concerned about your current weight?
    a. Not at all concerned
    b. Not very concerned
    c. Quite concerned
    d. Very concerned
11. Do you find it difficult to keep your weight at its current level? Yes/No
12. Which category best describes you?
    a. Not doing anything in particular for my weight
    b. Actively doing things to try to gain weight
    c. Actively doing things to try to lose weight
    d. Actively doing things to try to avoid gaining weight
13. If you are currently trying to lose weight or avoid gaining weight, which weight control methods are you using? (tick all that apply)

Reducing overall amount of food I eat	Doing physical activity or exercise	Taking diuretic or fluid pills
Watching the type of food I eat	Making self-vomit after meals	Taking laxatives
Reducing the amount of fat in my diet	Fasting or skipping meals	Taking other slimming tablets or pills
Avoiding sugar	Counting calories or kilojoule	Taking meal replacement drinks
Avoiding alcohol	Smoking for weight control	Other (please specify)

Appendix 3.4 Demographic characteristics of participants in Study 1 (Phase 1)

Participant number	Smoking status	Gender	Age	Educational qualification	Employment status	Smoking for	Quit attempts	Year quit smoking	Karl Fagerstorm Nicotine Tolerance Questionnaire score
P1	Smoker	Male	38	A-levels	Self-employed	16 years	Once	-	4 (medium dependence)
P2	Smoker	Male	42	GCSE	Disabled/ too ill to work	27 years	Once	-	7 (high dependence)
P3	Smoker	Female	27	Degree	Part-time	12 years	None	-	2 (low dependence)
P4	Smoker	Female	44	Below degree	Part-time	30 years	More than once	-	3 (low dependence)
P5	Smoker	Female	40	O level or GCSE equivalent	Full time	24 years	More than once	-	5 (medium dependence)
P6	Ex-smoker	Male	64	A-levels	Part-time	47 years	More than once	2010	-
P7	Ex-smoker	Female	43	Degree	Full-time	20 years	More than once	2004	-
P8	Ex-smoker	Female	36	Degree	Full-time	14 years	More than once	2004	-
P9	Ex-smoker	Female	35	Degree	Full-time	15 years	More than once	2009	-

Appendix 3.5 Main themes and sub-themes identified in the data (Phase 1).

Main theme	Sub-theme	Example quote
RESPONSES TO THE SMOKE-FREE LEGISLATION	**Normalisation of smoke-free environments*	P8 (ex-smoker): It's just, I think you've just got used to it. It's just normal now. I couldn't imagine people smoking in public places.
	The smoke-free law increased stigma for smokers	P8 (ex-smoker): If you're out with your friends and you have to keep going outside every 5 minutes to have a cigarette, it becomes… It's like… Making it feeling even worse to smoke I guess. Like you're sort of ummm, that you have to go elsewhere to do it.
	Predicting changing preferences	P1 (current smoker): Before the smoking ban I took a personal offence because you know it was… at least it was an infringement on my freedoms as an infringement on you know how I live, you know how I lived my daily routine… and within… probably within 3 days I actually thought, I had a conscious thought, actually this is a good idea and I was happy with it and I would never wavered from that.
	Increased awareness of effects of smoking	P4 (current smoker): I think a lot of non-smokers therefore realise how much smoke they've actually been having through passive smoking.
RESPONSES TO TOBACCO CONTROL POLICIES	**Motivational responses*	P4 (current smoker): personally I… nothing that has happened has really made me think 'oh I should definitely give up smoking.
	Direct behavioural impact	P9 (ex-smoker): I mean you can't just sit around a table in a pub smoking anymore I mean you have to specifically decide, 'I want to have a cigarette, what's the weather like? Am I going to go outside and do it? Is it worth that?'

****subthemes marked with an asterisk are discussed in more detail***

Cont. Main themes and sub-themes identified in the data.

Main theme	Sub-theme	Example quote
RESPONSES TO TOBACCO CONTROL POLICIES Cont.	Facilitation of self-monitoring	P4 (current smoker): I think I do smoke less, because of the smoking ban. If you were just sat there in a pub and they're there in front of you, you don't notice how many you're smoking, but you do tend to notice more what trips you're making outside.
	Perceptions of policy as control	P5 (current smoker): I don't know whether putting horrible pictures on cigarette packets actually, probably makes that much of an impact. Cause people who smoke, they know the damage their probably doing to themselves. I don't think they need to see it in black and white every time they pick up a cigarette packet.
SMOKING AND IDENTITY	**Attitudinal conflict*	P2 (current smoker): I think with some people… they're not really committed to giving up in a first place... You can come up with any excuse for not giving up (laughs). But for me (*after quitting smoking)* my personality was completely different and my ability to do my job was just reduced so drastically… Until, until I can find a reason why my whole persona, my mental abilities, my mental scope ummm changes so dramatically, unless I can counter that, I will keep smoking.
	Ex-smoker identity	P7 [ex-smoker]: I find, it's funny cause as a smoker I found it really social, now I'm a non-smoker, I view smoking as really anti-social. I've had several times where I've had like a dinner party or something, and the all the smokers head of out into the garden and, I thought that was really anti-social.

****subthemes marked with an asterisk are discussed in more detail***

Appendix 3.6 Materials used and topics discussed during the discussion group

Study stage	Topics discussed	What it aimed to achieve?
Discussion group	Obesity prevalence and consequences of obesity ▪ weight classification according to the BMI index ▪ obesity rates in the UK in 2011 and projected obesity rates in 2025 and 2050 ▪ direct and indirect consequences of obesity	Present participants with medical definition of overweight and obesity and present them with statistics regarding the number of overweight and obese individuals living in the UK.
	Influences on obesity (built environment, social environment and financial environment)	Emphasize that there are many influences on obesity.
	Obesity and social policy ▪ what a social policy is ▪ seven policy strands that aim to address obesity; as many of the discussed policies have not been implemented in the UK (e.g. a higher tax on products high in saturated fats), existing examples from the smoking context were given	Explain what the government can do to stop or reverse obesity trend. This part also aimed to help participants recognise many approaches that they encounter in daily life as an obesity strategy; existing tobacco control measures aimed to help participant envisage what the impact of those policies would be if they were in place
	Before attending individual interview participants were asked to: ▪ observe and notice environmental influences on their diet and physical activity choices; observe what triggers them to think about their weight; observe what makes it difficult to maintain healthy weight and what triggers them to think they should change their diet or exercise more. The second session was an individual interview with each participant that took place approximately seven days after the discussion group.	This task aimed to help participants observe influences on their weight and lifestyle habits

Appendix 3.7 Full interview schedule used in Study 1 (Phase 2)

I. Intro and breaking the ice

1. What do you think is the main reason for people gaining weight?
2. What do you think is the main challenge to losing weight?

II. Experience of controlling weight

3. How in control of your weight do you feel?
4. Tell me about how you have tried to control your weight before?
5. If it was not successful, why do you think this was? What makes it difficult for you to control your weight?
6. What do you think would help you control your weight?

III. Pressure to lose weight & environmental influences on lifestyle choices

7. Last week you saw a presentation and you were asked to observe what prompts you in your day to day life to think about, and do something about their eating and physical activity habits? Since you saw the presentation:
    a. Have you noticed anything that triggers you to think about your weight?
    b. Have you noticed anything that makes it difficult to maintain healthy weight?
    c. Have you noticed anything that triggers you to think you should change your diet or exercise more?

8. Are there any things that you avoid doing because of your weight?
9. Do you think that today's society has an influence on people's weight? *Difficult to lose weight, pressure to lose weight etc.*

IV. How are overweight people thinking about themselves/ their weight?

10. What do you think about your weight? Are you underweight, healthy weight, overweight or obese?
11. Do you think your weight has any effect on people around you? Does it have any effect on your family, on what you do?

V. Right of the government to introduce obesity measures

12. Give a news headline story e.g. 'Obesity 'could bankrupt the NHS' The rising levels of obesity could bankrupt the NHS if left unchecked, a British Medical Journal

report warns' (BBC news) (http://news.bbc.co.uk/1/hi/health/6180991.stm). How this makes you feel? *Are you aware that you are a part of the overweight group?*

13. Why do you think government is introducing such measures? *[Do you think government is interfering, helping, nannying?]*
14. How much of a role do you think the government should take in trying to reduce the number of obese people?
15. Is it legitimate for your GP to check your weight status/ ask for your weight, the same as your GP asks you for your smoking status/ the amount of alcohol you drink?
16. Do these policies require sacrifices? Would you be willing to sacrifice any degree of personal freedom to support policies that aim at reducing obesity rates?

VI. Attitudes towards obesity policy

17. Last week we were discussing some policies that the government is introducing to reduce the number of overweight and obese people, how these policies might affect overweight and obese people? *(reducing their autonomy/ freedom, helping them to lose weight, helping them realise how their weight affects them/people around them etc.)*
18. Do you think any of those could help you control your weight? And if yes, why?
19. What do you think are the main challenges to these policies being effective?
20. Do you think that people are willing to sacrifice personal freedom to support those policies? *(e.g. paying more for chocolate?)*

VI. Interview closing

21. Would you like to add anything else?
22. Do you have any questions you would like to ask?

Appendix 3.8 Press articles used during interviews in Study 1 (Phase 2)

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Last Updated: Friday, 15 December 2006, 07:17 GMT

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Obesity 'could bankrupt the NHS'

The rising levels of obesity could bankrupt the NHS if left unchecked, a British Medical Journal report warns.

Experts, including government A&E tsar George Alberti and Glasgow University professor Naveed Sattar, said obesity treatment took up 9% of the NHS budget.

One in five adults in the UK is obese

But they warned this would rise as the number of obese adults rose from one in five to one in three by 2010.

They said action was needed by all of society and even recommended a helpline for people who bought larger clothes.

The number should be promoted on the labels of all

"The problem of rising prevalence in obesity may get

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3 May 2011 Last updated at 07:51

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Being overweight 'linked to dementia'

By James Gallagher
Health reporter, BBC News

Middle aged people who are overweight but not obese, are 71% more likely to develop dementia than those with a normal weight, according to research.

Previous studies have indicated a link between obesity and dementia.

But a study 8,534 of Swedish twins, **in the journal Neurology**, suggests just being overweight is also a risk factor.

The study says 1.6 billion adults are overweight worldwide

About one out of every 20 people above the age of the 65 has dementia. The Alzheimer's Society said a healthy lifestyle could reduce the risk.

Those with a body mass index (BMI) - which measures weight relative to height - greater than 30, who are classified as obese, were 288% more likely to develop dementia than those with a BMI between 20 and 25, according to the study.

The clinically overweight, who have a BMI between 25 and 30, were 71% more likely.

Dr Weili Xu, from the Karolinska Institute in Stockholm, told the BBC: "We found in this study that being overweight is also a risk for dementia later in life."

Related Stories

- Large waist 'an Alzheimer's risk'
- Obesity increases dementia risk
- Obesity to fuel Alzheimer's rise

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UK women top of obesity league, and men are second – EU survey

Figures also reveal that more young people are obese in Britain than any other country in Europe

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Hannah Godfrey
The Guardian, Saturday 26 November 2011
Article history

Britain has a high number of obese women. Photograph: Brian Harris/Rex Features

Nearly a quarter (23.9%) of British women are obese, according to an EU

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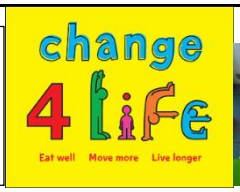
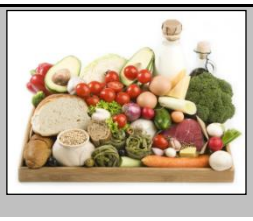
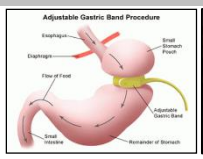
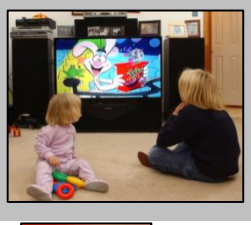
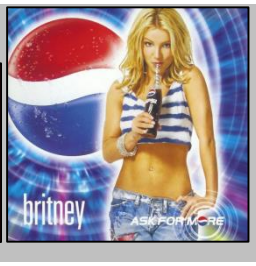
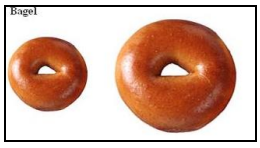
One in five children is

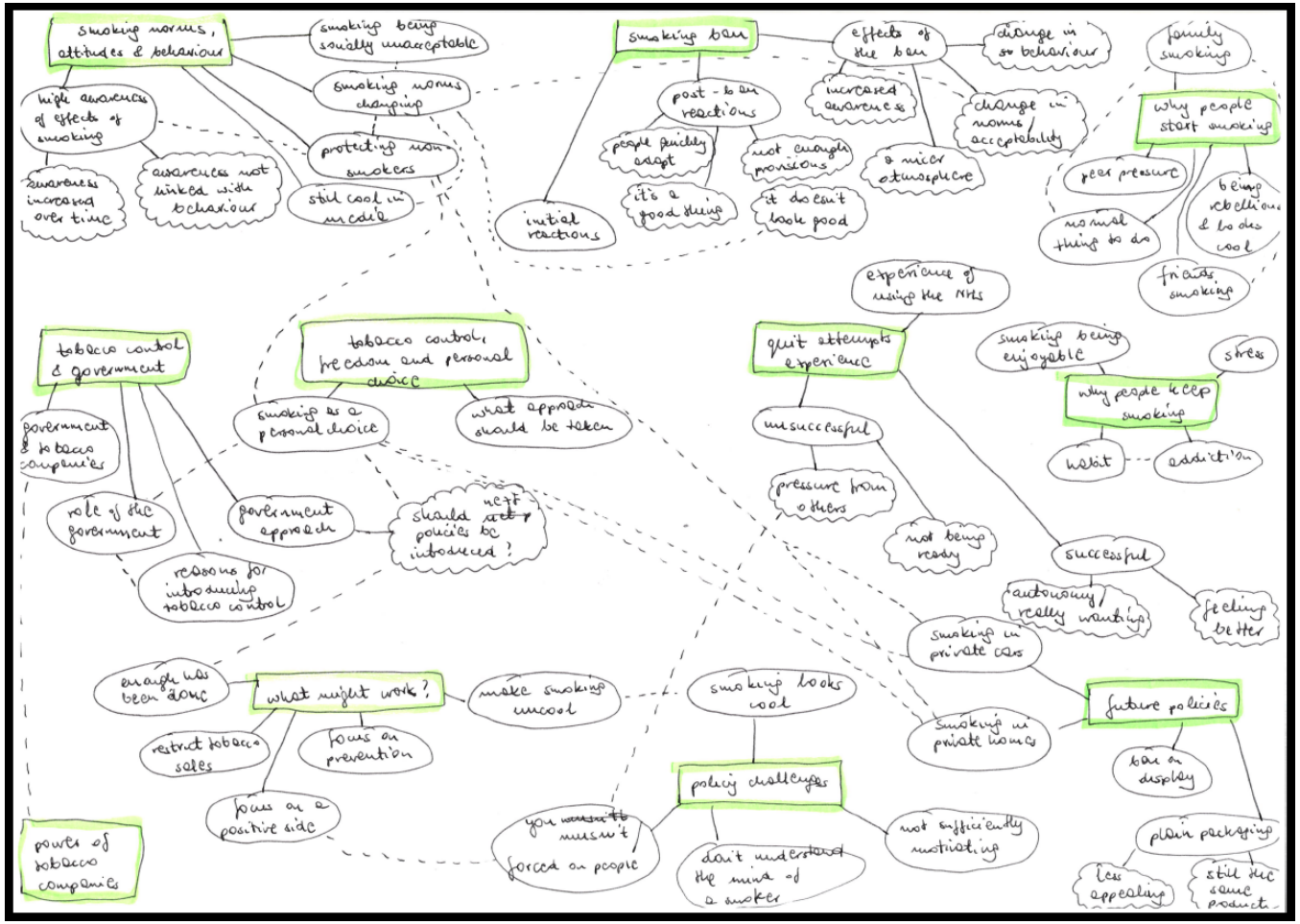
Appendix 3.9 List of obesity policy options presented during Study 1 (Phase 2)

Information and health promotion interventions	   
Price and tax measures	 
Labelling	 
Food free zones	
Clinical interventions and management	   
Reducing food promotion	  
Food industry regulation	   

Appendix 3.10 Initial themes and sub-themes identified in Phase 2

Themes	Subthemes
Consequences of obesity	• Obesity affects fashion choices • Obesity affects confidence (and participants were less likely to attend gym) • Health consequences of obesity far removed • No effect on other people (apart from direct effect such as taking up two seats on the bus) • Consequences on the NHS only in terms of surgery
Influences on people weight	• Other people do not support weight loss diet or healthy eating attempts • Being overweight and leading an unhealthy lifestyle is now the norm • No pressure to lose weight among women • There are things that we cannot change like metabolism or some illnesses like thyroid problems • Times have changed
Barriers to healthy lifestyle/ losing weight	• Unhealthy lifestyle is a default option (does not require a special effort, while leading a healthy lifestyle requires a complete change of eating and physical activity habits) • Healthy diet not very appealing (e.g. difficult to find healthy treats) • Treating yourself every day • Healthy lifestyle is not a priority/ health rationale not important for behaviour change • Supermarket offers are tempting • A long way to go- people are often discouraged
Perceptions of current obesity control	• More government initiatives that encourage people or that give practical advice • Mixed messages or too many messages- too much conflicting information • Scare tactics work, but they cannot be too scary • Increase the role of GP • Although aware of the NHS services, not willing to try them • Choice and personal responsibility (it should be individual's choice) • Education is the key- therefore obesity policy should focus on childhood policies such as cookery classes
Perception of a difference from other overweight people	• Different reasons for being overweight from other overweight people • Other people might cost the NHS but not me • Obesity health message not personally applicable (Pictures serve as a warning or reminder what might happen in the future)
What could help me?	• Try approaches they have already tried in the past (e.g. a boot camp) • Incentives from the government (this would also show that they 'care')

Appendix 3.11 A thematic map of potential clusters and codes identified in Phase 1



Appendix 3.12 Study 1 (Phase 2) participants' demographic characteristics

Pt no	Gender	BMI*	Ethnic group	Age	Educational qualification	Employment status	Methods used to control weight
1	Female	31.5	White British	52	O Level or GCSE equivalent (Grade A - C)	Employed full-time	Watching the type of food she eats; Current member of Slimming World
2	Female	28	Other White background	32	Degree or higher degree	Employed full time	Watching the type of food; Reducing the amount of fat in diet; Doing physical activity or exercise
3	Male	34.5	White British	55	O Level or GCSE equivalent (Grade A - C)	Disabled or too ill to work	Watching the type of food; Reducing the amount of fat in diet; avoiding sugar
4	Male	29.5	Black British	45	Degree or higher degree	Employed part-time	Reducing the amount of fat in diet
5	Male	27	White British	49	Higher education qualification below degree level	Employed part-time	Watching the type of food; Reducing the amount of fat in diet; doing physical activity or exercise
6	Female	30	White British	48	Degree or higher degree	Employed part-time	Watching the type of food; Reducing the amount of fat in diet; doing physical activity or exercise
7	Female	29.5	White British	30	Degree or higher degree	Employed full time	Reducing overall amount of food; Watching the type of food; Fasting or skipping meals; Counting calories or kilojoules; Taking meal replacement drinks
8	Female	35	Black Caribbean	29	O Level or GCSE	Employed part-time	Doing physical activity or exercise; fasting or skipping meals
9	Female	27.5	Black Caribbean	38	Higher education qualification below degree level	Unemployed	Reducing the amount of fat in the diet; Avoiding sugar; Avoiding alcohol

***** *BMI was calculated using participants' self-reported weight and height.*

Cont. Study 1 (Phase 2) participants' demographic characteristics**.**

Pt no	Gender	BMI*	Ethnic group	Age	Educational qualification	Employment status	Methods used to control weight
10	Female	33	White British	48	Degree or higher degree	Unemployed	Watching the type of food; Reducing the amount of fat in diet; Avoiding sugar; Avoiding alcohol
11	Male	34	White British	32	A-levels or highers	Unemployed	Reducing overall amount of food
12	Male	33	White British	43	O Level or GCSE equivalent (Grade A - C)	Unemployed	Doing physical activity or exercise
13	Male	32	White British	33	O Level or GCSE equivalent (Grade A - C)	Disabled or too ill to work	Watching the type of food he eats
14	Male	29	White British	60	Higher education qualification below degree level	Unemployed	Reducing overall amount of food; avoiding sugar; doing physical activity or exercise
15	Female	20	White British	31	Degree or higher degree	Employed full time	Reducing overall amount of food; Watching the type of food; Reducing the amount of fat; avoiding sugar; Avoiding alcohol; Counting calories or kilojoules; Taking laxatives; Doing physical activity or exercise
16	Female	24	White British	34	Degree or higher degree	Employed full time	Reducing overall amount of food; Watching the type of food; Reducing the amount of fat; avoiding sugar; Avoiding alcohol; Counting calories or kilojoules; Doing physical activity or exercise
17	Male	24	White British	27	Degree or higher degree	Employed full time	Watching the type of food; avoiding sugar; doing physical activity or exercise

***** *BMI was calculated using participants' self-reported weight and height.*

Appendix 3.13 Full list of themes and subthemes identified in Study 1 (Phase 2)

Theme	Sub-theme	Example quote
Reasons and motives for weight loss	Better appearance as main motivator	P4 (male, BMI 29.5): I wanna lose weight cos I wanna present positively, so that is important, that is quality of life innit if you're confident about the way you look innit
	More initiatives to encourage people needed	P6 (female, BMI 30): Also like swimming pools they should… be a time in a day when you can go to the swimming pool for free… It would encourage me.
	Role of GP in obesity management	P2 (female, BMI 28): I think that's probably the strongest nudge the person can get [information from your GP], because if it is a professional who tells you: you know you should really lose some weight and here is the way you can do it. I think that's probably the best, I mean the most guaranteed if I would say that.
Perception of what is normal	Being overweight perceived as normal	P8 (female, BMI 35): I don't really think, you know the figure that you were showing us [during the discussion group] last week, I didn't realize there was a lot people that were overweight or sorry obese. For when I walk around genuinely I didn't think most people are. I don't actually look at people that much in that sense.
	Unhealthy lifestyle easy and convenient	P3 (male, BMI 34.5): [convenience food] it's just easier isn't it, take it out of packet and throw it in the microwave rather than preparing a healthy meal, it's short, it's quick.
	Healthy lifestyle not a priority	P5 (male, BMI 27): not having time to seriously do exercising and thinking about healthy eating and stuff. You know, you're studying, you're working at the same time, you've got very little time to do the stuff that … you just put it off and think oh I'll get to it, I won't, but you never do.
	Family/ friends not being supportive	P1 (female, BMI 31.5)**:** When in the past I had actually said no *(to unhealthy food)* I don't want that, then they say oh, you know, come on, go on. They force it upon you, you know.
	Food industry undermining diet attempts	P5: So they will be half price or buy one get one free and you think oh I've got to have it, because it's half price.

Theme	Sub-theme	Example quote
Experience of obesity preventive policies	My weight problems are special	P10 (female, BMI 33): But I think because I myself I'm 5-6 stone overweight, then it's not so easy to lose, plus there are other mitigating factors with me, like I have a thyroid problem now. A lot of people say I have a thyroid problem, but I do, I have to take tablets for this everyday. I am also, the age I'm at, I'm practically postmenopausal, I'm 48-49 and postmenopausal, so this does make a difference I believe.
	Mixed messages or too many messages	P5 (male, BMI 27): there is very mixed messages from the media, is that umm supermarkets for instance continuously advertising in papers, on TV and radio and with offers on particular foods or alcohol or snacks and umm and then you get the other which is you know the Change for Life type programmes, which are also on the TV
	Choice and personal responsibility	P4 (male, BMI 29.5): give them a full picture, let them know the pros and cons, let them know the pros and cons of the possible choices they can make and the consequences of those choices and then let them make up their own mind
	Education is a key	P1 (female, BMI 31.5): And as I said, prevention is always best than cure so they've got to ummm provide better education.
Opportunities to weight loss	Support from other people	P7 (female, BMI 29.5): support from friends and family… just someone to keep putting it in perspective for you… it's just quite hard to motivate yourself to do that all the time.
	Healthy products at lower prices	P7 (female, BMI 29.5): [talking about healthy food options] having that balance there and not just like a small bowl of apple that is not particularly appetizing. Have something that is appetizing like you know couscous salad or something that looks really nice, that's the same price or cheaper that the four pound hotdog.
	Cheaper ways to exercise	P13 (male, BMI 32): To go when you want and how much you want is something like 85 pounds a month and real people can't afford that. So if you've got a normal job with bills to pay and stuff like that, you can't afford 85 pounds a months for the gym, it's a luxury

Appendix 4.1 Photos of the models used in Study 2

Obese female model	Overweight female model
	
Obese male model	**Overweight male model**
	

Appendix 4.2 Article reporting research published on the Science Daily website

Source: *http://www.sciencedaily.com/releases/2007/09/070910162400.htm*

Being Overweight May Independently Increase Risk For Heart Disease

Sep. 16, 2007 — Being moderately overweight or obese appears to increase the risk for developing coronary heart disease events independent of traditional cardiovascular risk factors, according to a meta-analysis of previously published studies in the September 10 issue of Archives of Internal Medicine.

Nearly two-thirds of U.S. adults are overweight and therefore at higher risk for heart disease, other illnesses and death, according to background information in the article. "Because of the high prevalence of overweight and the expected future increases, it is essential to gain precise insight into the consequences of overweight for health and into the metabolic pathways that link the two," the authors write.

Rik P. Bogers, Ph.D., of the Centre for Prevention and Health Services Research, National Institute for Public Health and the Environment, Bilthoven, the Netherlands, and colleagues combined data from 21 previous studies of overweight and heart disease that included a total of 302,296 participants.

A total of 18,000 heart events or deaths occurred among these participants during the studies. After the researchers factored in age, sex, physical activity levels and smoking, moderately overweight individuals had a 32 percent increased risk of heart disease compared those who were not overweight. Obesity increased their risk 81 percent over those of normal weight.

The researchers then adjusted the figures further for blood pressure and cholesterol levels. This reduced the excess risk associated with being moderately overweight by 47 percent, to 17 percent, and with obesity by 40 percent, to 49 percent. For every five units an individual's body mass index increased, the risk for heart disease increased 29 percent before adjusting for blood pressure and cholesterol and 16 percent after adjustment.
"Hence, the present study indicates that adverse effects of overweight on blood pressure and cholesterol levels could account for about 45 percent of the increased risk of coronary heart disease, and that there is still a significantly increased risk of coronary heart disease that is independent of these effects," the authors write. "This implies that, even under the theoretical scenario that optimal treatment would be available against hypertension and hypercholesterolemia in overweight persons, they would still have an elevated risk of coronary heart disease."

They propose several other mechanisms by which being overweight could increase the risk of heart disease, including constant low-grade inflammation, problems with blood vessel function or an imbalance in blood chemicals that could lead to more clotting.

Appendix 4.3 Article from the BBC website

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3 May 2011 Last updated at 07:51

227 Share

Being overweight 'linked to dementia'

By James Gallagher
Health reporter, BBC News

Middle aged people who are overweight but not obese, are 71% more likely to develop dementia than those with a normal weight, according to research.

The study says 1.6 billion adults are overweight worldwide

Previous studies have indicated a link between obesity and dementia.

But a study 8,534 of Swedish twins, **in the journal Neurology**, suggests just being overweight is also a risk factor.

About one out of every 20 people above the age of the 65 has dementia. The Alzheimer's Society said a healthy lifestyle could reduce the risk.

Those with a body mass index (BMI) - which measures weight relative to height - greater than 30, who are classified as obese, were 288% more likely to develop dementia than those with a BMI between 20 and 25, according to the study.

The clinically overweight, who have a BMI between 25 and 30, were 71% more likely.

Dr Weili Xu, from the Karolinska Institute in Stockholm, told the BBC: "We found in this study that being overweight is also a risk for dementia later in life."

Related Stories

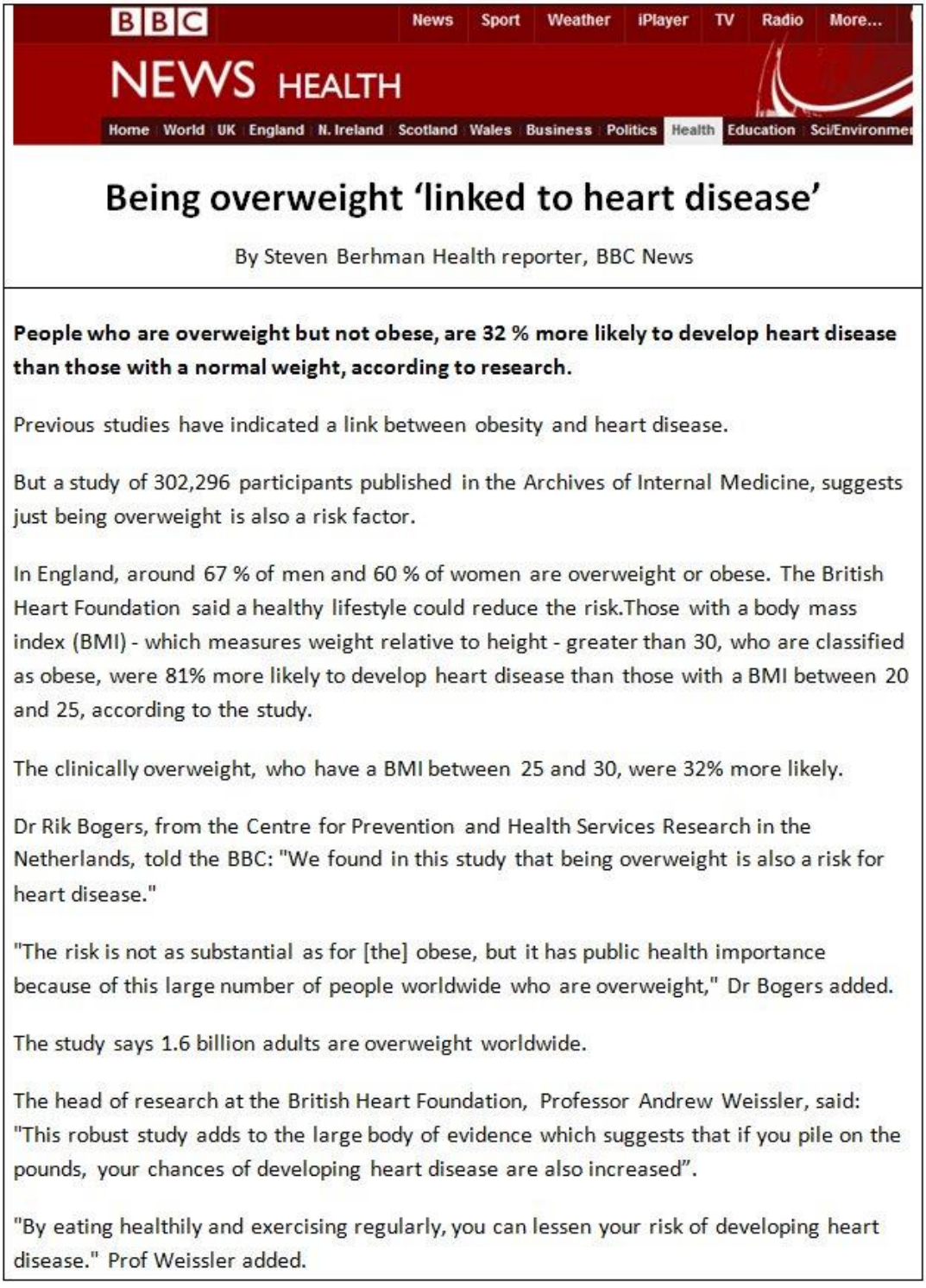
Large waist 'an Alzheimer's risk'

Obesity increases dementia risk

Obesity to fuel Alzheimer's rise

Appendix 4.4 Article used in Study 2

Article used in Study 2 (no photo condition)



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Being overweight 'linked to heart disease'

By Steven Berhman Health reporter, BBC News

People who are overweight but not obese, are 32 % more likely to develop heart disease than those with a normal weight, according to research.

Previous studies have indicated a link between obesity and heart disease.

But a study of 302,296 participants published in the Archives of Internal Medicine, suggests just being overweight is also a risk factor.

In England, around 67 % of men and 60 % of women are overweight or obese. The British Heart Foundation said a healthy lifestyle could reduce the risk.Those with a body mass index (BMI) - which measures weight relative to height - greater than 30, who are classified as obese, were 81% more likely to develop heart disease than those with a BMI between 20 and 25, according to the study.

The clinically overweight, who have a BMI between 25 and 30, were 32% more likely.

Dr Rik Bogers, from the Centre for Prevention and Health Services Research in the Netherlands, told the BBC: "We found in this study that being overweight is also a risk for heart disease."

"The risk is not as substantial as for [the] obese, but it has public health importance because of this large number of people worldwide who are overweight," Dr Bogers added.

The study says 1.6 billion adults are overweight worldwide.

The head of research at the British Heart Foundation, Professor Andrew Weissler, said: "This robust study adds to the large body of evidence which suggests that if you pile on the pounds, your chances of developing heart disease are also increased".

"By eating healthily and exercising regularly, you can lessen your risk of developing heart disease." Prof Weissler added.

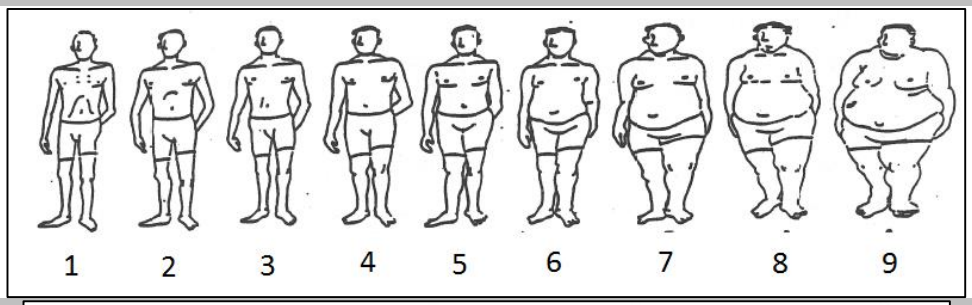
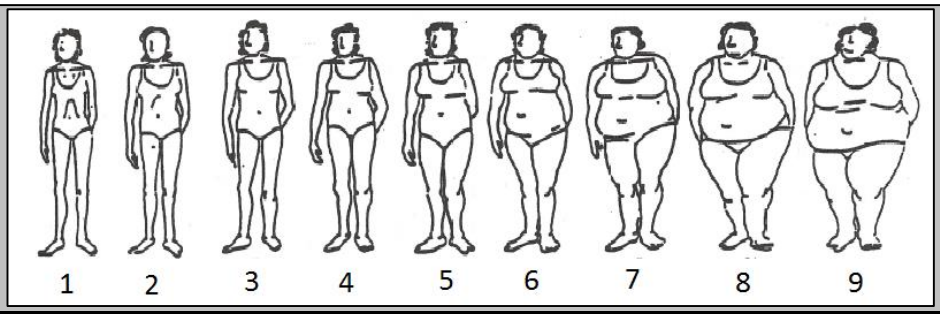
Appendix 4.5 Questionnaires incorporated in Study 2

4.5.1 Obesity Health Risk Scale

You are now going to read a series of statements about health risks of being overweight. Please indicate how much you agree with each statement.

	False	Uncertain	True
Being overweight increases the risk of developing high blood pressure	1	2	3
Being overweight increases the risk of getting certain types of cancers	1	2	3
Overweight people can expect to live as long as nonoverweight people	1	2	3
There is a major health benefit if an overweight person loses weight	1	2	3

4.5.2 Perceived health and weight status

In general, would you say your health is?	Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)
How would you describe your current weight?	Very underweight (1)	Somewhat underweight (2)	About right (3)	Slightly overweight (4)	Very overweight (5)
Please indicate the figure that most resembles you					
					

How concerned are you about your current weight?	Not at all concerned (1)	Not very concerned (2)	Quite concerned (3)	Very concerned (4)
Do you consider your weight as harmful to your health?	Not at all harmful (1)	Not very harmful (2)	Quite harmful (3)	Very harmful (4)
Which category best describes you?	Not doing anything in particular for my weight (1)	Actively doing things to try to gain weight (2)	Actively doing things to try to lose weight (3)	Actively doing things to try to avoid gaining weight (4)

Perceived heart disease and stroke risk

	Much lower than average	**Lower than average**	**About average**	**Higher than average**	**Much higher than average**
Compared to others of the same age and sex, how would you rate your risk of having a heart attack within the next 10 years?	1	2	3	4	5
Compared to others of the same age and sex, how would you rate your risk of having a stroke within the next 10 years?	1	2	3	4	5

4.5.3 Perceived weight locus of control

You are now going to read four statements. Please indicate how much you agree with each statement.

	1 (strongly disagree)	**2**	**3**	**4**	**5**	**6 (strongly agree)**
Whether I gain, lose, or maintain my weight is entirely up to me.	6	5	4	3	2	1
Being the right weight is largely a matter of good fortune	1	2	3	4	5	6
If I eat properly and get enough exercise and rest, I can control my weight in the way I desire.	6	5	4	3	2	1
No matter what I intend to do, if I gain or lose weight, or stay the same in the near future, it is just going to happen.	1	2	3	4	5	6

4.5.4 Reaction to article and article comprehension

Which one of the statements below best describes your attitude / reaction to the article you've just read? (please select one option):

- I didn't read it.
- I skimmed it and didn't really put much thought into it.
- I read it, but didn't really retain much or get a clear message from it.
- I read it, understood the message, but it doesn't really interest me.
- I read it, found the message interesting, but it doesn't really apply to me.
- I read it, found the message interesting and think it applies to me.
- Other (please specify)

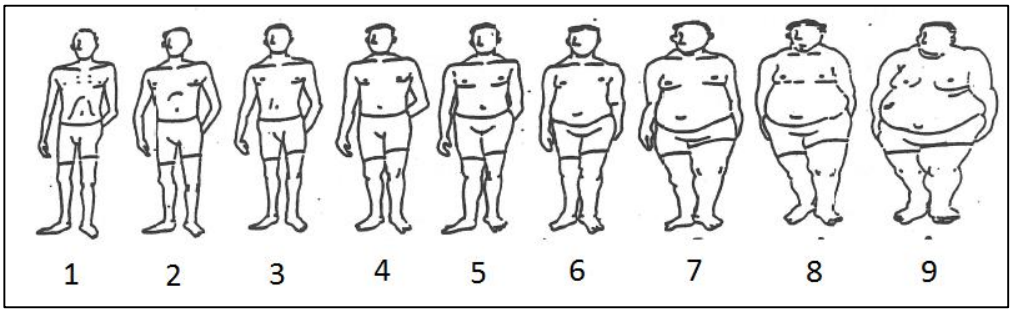
According to the article, how much more likely to develop heart disease are people who are overweight (BMI 25-30)?

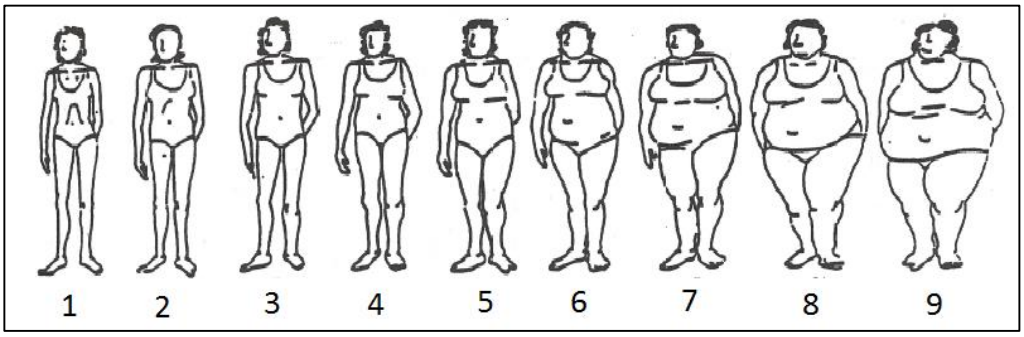
- 32%
- 81%
- 17%

In what scientific journal was the study described in the article published?

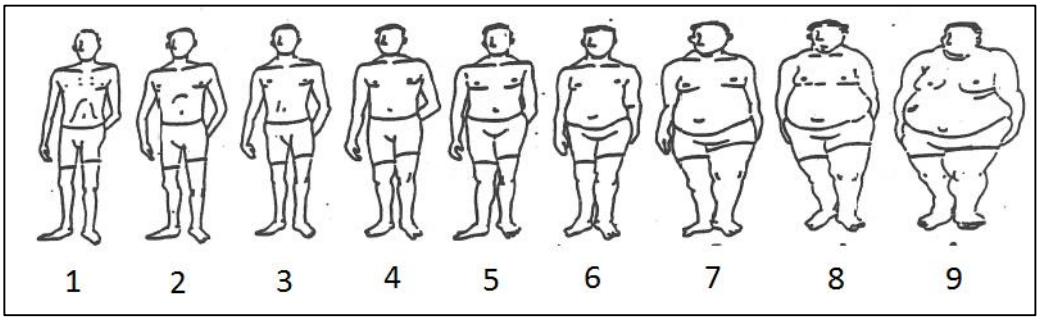
- Journal of Cardiovascular Disease Research (0)
- American Heart Journal (0)
- Archives of Internal Medicine (1)

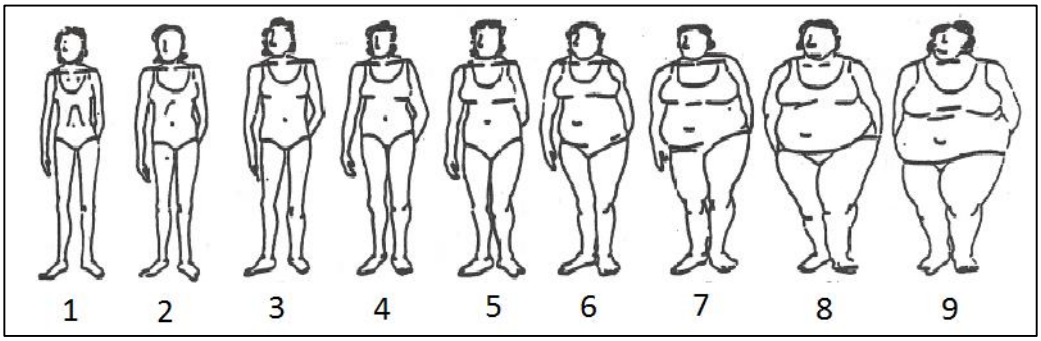
If there was a photo in the article, indicate the figure that you think most resembles the model from the photo shown in the article.





From what you understood from the article, please indicate the size from which the risk of heart disease starts to increase?





4.5.5 Motivation for weight control

Many people take steps to control their weight by eating a healthy diet, exercising or doing both. Thinking about the occasions when you change what you eat or how much exercise you take for health reasons, please indicate what are the reasons you have in mind:

	1 (not at all true)	**2**	**3**	**4**	**5**	**6**	**7 (very true)**
Because I feel that I want to take responsibility for my own health.	1	2	3	4	5	6	7
Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.	1	2	3	4	5	6	7
Because I personally believe it is the best thing for my health.	1	2	3	4	5	6	7
Because others would be upset with me if I did not.	1	2	3	4	5	6	7
I really don't think about it.	1	2	3	4	5	6	7
Because I have carefully thought about it and believe it is very important for many aspects of my life.	1	2	3	4	5	6	7
Because I would feel bad about myself if I did not eat a healthy diet.	1	2	3	4	5	6	7
Because it is an important choice I really want to make.	1	2	3	4	5	6	7
Because I feel pressure from others to do so.	1	2	3	4	5	6	7
Because it is easier to do what I am told than think about it.	1	2	3	4	5	6	7
Because it is consistent with my life goals.	1	2	3	4	5	6	7
Because I want others to approve of me.	1	2	3	4	5	6	7
Because it is very important for being as healthy as possible.	1	2	3	4	5	6	7
Because I want others to see I can do it.	1	2	3	4	5	6	7
I don't really know why.	1	2	3	4	5	6	7
I never change what I eat or how much I exercise for health reasons.	1	2	3	4	5	6	7

Appendix 5.1 Elements of process evaluation

Elements of process evaluation [adapted from Saunders et al. (2005)]

Component	Purpose	Summative use
Fidelity (quality)	The extent to which intervention was delivered as planned	Describe how much of the intervention was delivered as planned/ what would be a high-quality intervention implementation?
Dose delivered (completeness)	How much of the intended intervention was delivered	Describe amount or number of intended units of intervention or components delivered.
Dose received (exposure)	Extent to which participants actively engaged in the intervention	Describe how much of the intervention was received.
Dose received (satisfaction)	Participant satisfaction with the intervention	Describe participant satisfaction with the intervention and state how feedback was used.
Reach (participant rate)	Proportion of the intended audience who took part in the intervention	Describe how much of the intended audience was recruited, compare those who were recruited with those who did not take part in the intervention.
Recruitment	Methods used to approach and recruit participants, includes maintenance of participation and promoting active involvement.	Describe recruitment procedures
Context	Aspects of the environment that might have affected study outcomes.	Describe elements of the environment that might have affected intervention implementation or intervention outcomes

Appendix 5.2 Behaviour change techniques used in Juicy June

Determinant	Behaviour change technique	Application
Provide autonomy support	Provide choice within specific rules and limits [1]	The provision of choice was achieved by maximising the options available regarding the swap participants wish to make, type of self-monitoring tool they were going to use (e.g. use of paper calendar, text messages, emails). Also it was acknowledged that for some people none of these techniques might work and they were encouraged to set up their own reminders as they know what works for them.
	Use of non-controlling language [2]	e.g.: '*we will help you to think about what habits you might try to change'*
	Delegate responsibility[2]	It was emphasized that participants were the best judges in terms of what is going to work for them (and for example they should make the choice regarding the method of self-monitoring they were going to use) e.g. '*We will give you some ideas, and help you to do this, but it's important that what you choose to change is your choice, and something you think you can manage'*
	Provide personalised information[3]	Participants were provided with a personalised dietary feedback at the baseline and at Juicy June evaluation.
	Provide structure[3]	Participants were given clear instructions on what they would be asked to do, for how long, what kind of support they would be given and how they can benefit from Juicy June.

1 (Williams et al., 1999)

2 (Deci et al., 1994)

3 (Mageau & Vallerand, 2003)

cont. Behaviour change techniques used in Juicy June.

Determinant	Behaviour change technique	Application
Promote self-efficacy / competence support	Prompt self-monitoring of behaviour[4]	Each participant was provided with a Juicy June calendar to help them monitor their progress; additionally they were also asked to set up reminders/ monitoring tools that they think would work for them
	Provide information on consequences of behaviour in general[4]	Participants were provided with dietary feedback (fat, fruit and vegetable and fibre intake) which used traffic light colour coding to indicate whether participants were eating low, medium or high levels of these nutrients. These graphs were presented with general information about likely consequences of having a diet low/high in these three nutrients.
	Goal setting (behaviour) [4]	Participants were asked to nominate an unhealthy snack that they were going to replace with something more healthy (involving fruit or vegetables) from the 1st of June 2013.
	Provide informational feedback [5]	Participants were provided with personalised dietary feedback at the baseline and at the end of the study. Feedback was presented alongside current governmental guidelines on recommended levels of these dietary components.
	Provide information [6]	Facebook updates were providing neutral information about healthy eating (see Appendix 5.5)

4 (Michie et al., 2011)

5 (Mageau & Vallerand, 2003)

6 (Reeve, 2009)

Table 5.1 cont. Behaviour change techniques used in Juicy June.

Determinant	Behaviour change technique	Application
Promote self-efficacy / competence support	Provide feedback on performance [7]	At the end of Juicy June, participants were provided with feedback on their diet.
	Provide general encouragement [8]	Some Facebook updates during Juicy June were aimed at providing encouragement (Appendix 6.4)
	Action planning [8]	Participants were asked to make specific plans (if-then plans) regarding when, where and how they will make the changes.
	Barrier identification/problem solving [8]	Participants were asked to think about possible barriers they might encounter when trying to change the behaviour (e.g. other people offering unhealthy food, being tempted by unhealthy foods available at home) and ways of overcoming them. They were also asked to think in advance about the change they were about to make (e.g. to make sure that they do not run out of apples)
Reduce social undermining	Plan social support [8]	Participants were encouraged to seek support via the Facebook community page that has been running since 20th of April 2013, with regular updates being posted between 23rd of May 2013- 2nd July 2013. The aim of this community was to establish an online Juicy June community, to encourage participants to seek social support among Juicy June community members, to encourage them to share experiences and to provide general encouragement and to provide participants with information about healthy diets.

7 (Michie et al., 2011)

8 (Ryan & Deci, 2008)

Appendix 5.3 Example of a diet feedback used in Juicy June

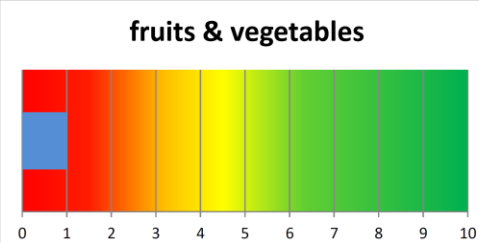
YOUR DIET FEEDBACK

Thank you for filling in the questionnaire about your diet. Now we can give you your personalised feedback. On the right you will find 3 graphs showing your daily intakes of fruits & vegetables, fat and fibre. Graphs have a traffic light colours background representing the recommended intakes of these foods (for fruits & vegetables and fibre: red-low; orange- medium, green- high; and reverse for fat: green-low, orange-medium, red-high).

On the right we present the NHS guidelines on how much of these three we should consume and why.

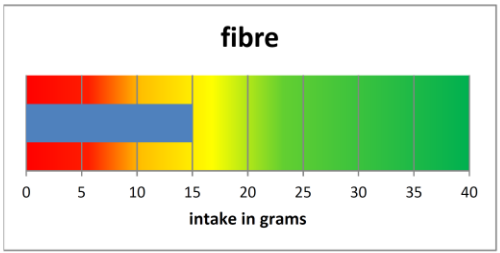
This feedback might help you decide what you could change in terms of your diet. We're not asking you to reach all the recommended intakes straight away but this feedback may help you to think about what might be most important for you to change.

FRUITS AND VEGETABLES INTAKE



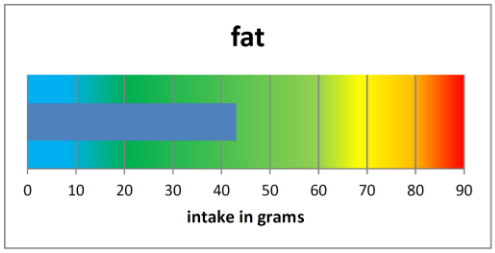
Fruit and vegetables are a vital source of vitamins and minerals. They are part of a balanced diet and can help us stay healthy. They can help reduce the risk of heart disease, stroke and some cancers. Fruit and vegetables are also usually low in fat and calories (provided you don't fry them or roast them in lots of oil). That's why eating them can help you maintain a healthy weight and keep your heart healthy. The Government recommends that all healthy individuals should consume a diet that contains **at least 5 portions** of a variety of fruit and vegetables a day.

FIBRE INTAKE



Fibre is an important part of a healthy diet. A diet high in fibre has many health benefits. It can help prevent heart disease, diabetes, weight gain, some cancers and it can also improve your digestive health. Fibre is only found in foods that come from plants. Foods such as meat, fish and dairy products don't contain fibre. However, many people don't get enough fibre. On average, most people in the UK get about 14g of fibre a day. You should aim for **at least 18g a day**.

FAT INTAKE



Fats form an important part of our diet; they provide the body with energy and with some important vitamins (for example, vitamins A & D). They also contain essential fats which the body is unable to make for itself, however, eating too much fat can be unhealthy. High levels of fat are found in harder fats like lard, butter, fats on meat and are found in fatty meat products, pastries, cakes, biscuits, in full fat dairy foods, and take-away meals. **Women should consume around 70 grams, while men around 95 grams of total fat a day**.

**Please note that while consuming more fruit & veg and fibre than recommended is good for our health, we should aim to eat a low fat diet (hovewer a diet very low in fat is not good for our health).*

What could you swap?

You scored low on fat, suggesting you have a low fat intake which is a very good thing. However, your diet appears to be very low in fruits and vegetables and low in fibre. By eating more fruits and vegetables you could increase your fibre intake (as fibre is only found in foods that come from plants). You tend to have different snacks throughout the week, mostly crisps, chocolate, salty snacks, biscuits and sweets & gums. These snacks can be full of hidden nasties like saturated fat, salt and sugar. How about swapping some of these snacks for fruit or veg? This would help you to increase both your fibre and fruits & veg intake.

What does research evidence says about changing eating habits?

In this campaign, we are challenging you to swap one unhealthy habit within your diet for one healthy alternative for one month. So you will not be simply asked to start eating something healthy (e.g. an apple) and continue with your normal diet, but to swap something unhealthy for something healthy.

Healthier alternatives to sweet snacks

It's important that what you choose to change is your choice, and something you think you can manage. Below are some suggestions for healthy swaps

- Swap sweets such as candies or fruit jellies for chunks of melon, strawberries, grapes, or whatever you have to hand. Look out for fruit that's in season, it's likely to be cheaper
- If you find yourself craving chocolate, biscuits or cake with your afternoon tea, try a small handful of dried fruit such as cranberries, raisins or a couple of apricots instead.
- You could swap one of your daily cups of tea or coffee for a glass of 100% unsweetened fruit juice (Juice counts as a maximum of one portion a day, however much you drink. That's mainly because juice contains less fibre than whole fruits and vegetables.)

One small step at a time.

Research evidence suggests that people are more likely to be successful at changing their behaviour if they pick one small area and make a concerted effort to change it. Trying to change too many things might be overwhelming. One small step is better than a leap that is likely to fail.

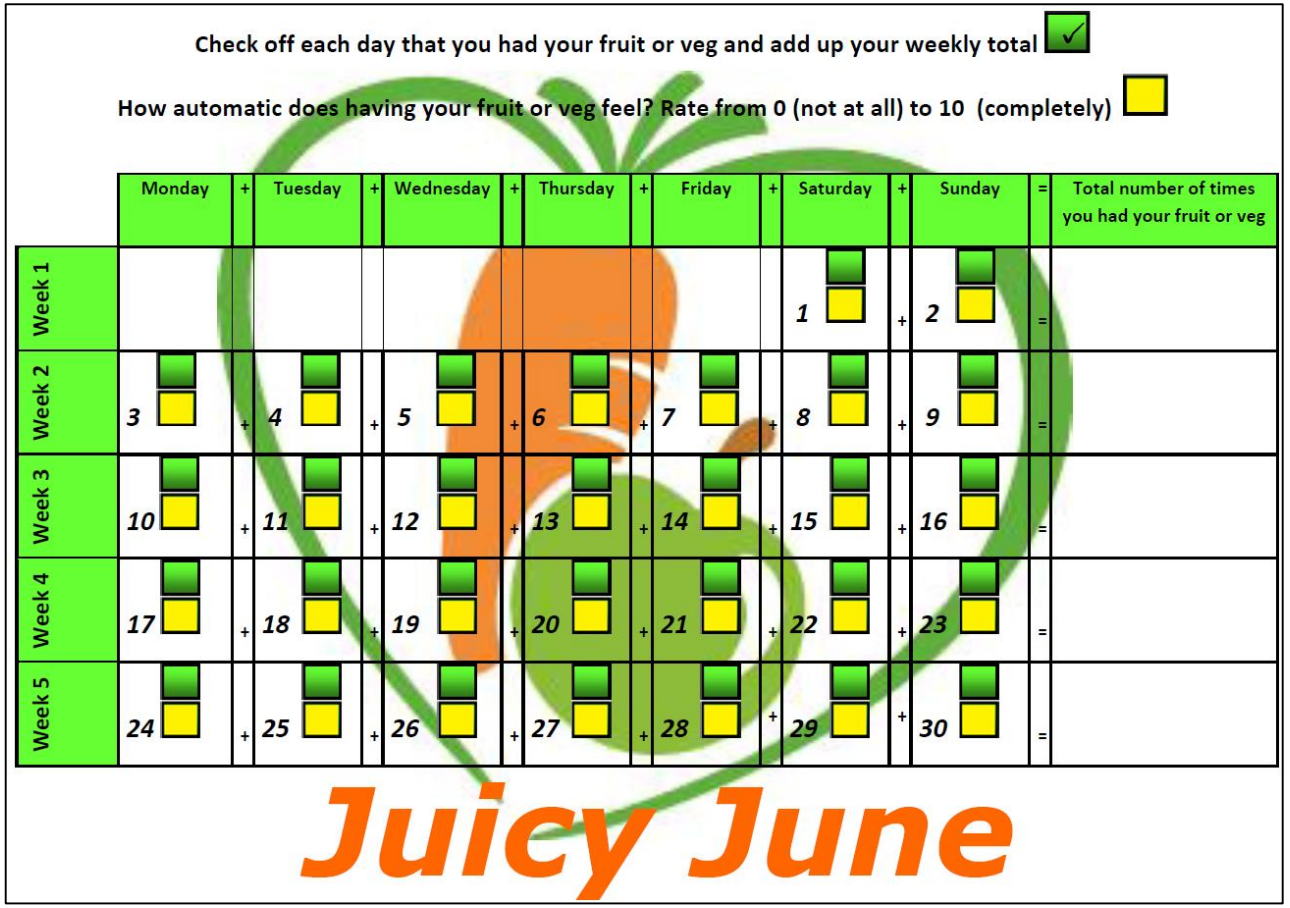
Why it is easier to perform a behaviour, if you do it every day for a month:

- research evidence suggest that if you repeat the same behaviour in the specific context (e.g. always before dinner), it increases the chances that you will not forget about it and it will soon become your habit
- As time goes on, it gets easier, as your new activity starts to get automatic
- no worries if you miss your fruit or veg once or twice. This will not affect significantly the formation of your new healthy habit. But be careful not to miss your behaviour more than twice.

Finally- let us know about your swap

Please let us know what have you decided to change so that we can monitor your progress and at the end of the Juicy June let you know how you did. Please follow the link below and answer two short questions about your swap:
https://www.surveymonkey.com/s/JuicyJuneSwap

Appendix 5.4 Juicy June calendar



Appendix 5.5 Juicy June Facebook updates

Date posted	Category	Material published on Facebook
23rd May	Suggestions for swaps	**Still not sure what to swap? Here are some suggestions.** Healthier alternatives to sweet snacks If you find yourself craving chocolate, biscuits or cake, why not try one of these instead? Fruit is sweet and tasty, and is a much healthier alternative to potato crisps, biscuits or chocolate. Chunks of melon, strawberries, grapes, or whatever you have to hand. Look out for fruit that's in season, it's likely to be cheaper. Dried – how about a small handful of dried fruit such as cranberries, raisins or a couple of apricots. But be careful not to eat too many dried fruits. While dried fruits like apricots, raisins etc. count towards your five-a-day, once fruit is dried it also becomes a concentrated source of sugar and calories. Healthier breakfast Swap a sprinkle of sugar on your breakfast cereal for a topping of fresh or dried fruit Healthier lunch Swap the second sandwich for some salad Swap a side of chips for a side of salad Healthier desserts Swap apple pie for a baked apple Swap biscuits for fruit (e.g. for two satsumas)
29 May	Final instructions	Check these final instructions to find the answer to any last minute questions you may have. If you have any questions post them here and we will answer them before Juicy June starts.
30 May		Keep up-to-date with the latest Juicy June news from today here on Facebook. With only one more day to go until Juicy June, we hope you're as excited as we are!

Date posted	Category	Material published on Facebook
WEEK 1 OF JUICY JUNE		
1 June-Saturday	Welcome to Juicy June	Juicy June has arrived! Are you ready to take the diet challenge? There are exactly 30 days to go! Did you know that 91 participants are attempting to complete Juicy June? Good luck to all Juicy Juners!
3 June-Monday	What other people have decided to swap	Kuba has decided to swap his after dinner chocolate for some fresh fruit. He checked what's in season now and decided to have some strawberries (with no cream!). Simon had been meaning to cut down on eating biscuits at work for some time, but there never seemed to be a reason to get round to it. He joined Juicy June to see if he could kick the habit, by reaching for a satsuma every time he would have previously reached for a biscuit. Maxine's swop involved stopping eating her afternoon ice lolly and replacing it with a piece of fruit, an orange or an apple. What have YOU decided to change?
5 June-Wednesday	Recommendations for reminders	Some recommend sticking a reminder on the desk or setting up a calendar pop-up reminder. What are your top tips to remind you about your Juicy June food?
7 June-Friday	Photos of Juicy June swaps	How are you getting on? There are some pictures of Juicy June swaps in the photo gallery. Check out what other Juicy Juners have decided to change. Upload your photos and share with others what you're swapping! 

Date posted	Category	Material published on Facebook
WEEK 2 OF JUICY JUNE		
10 June-Monday	Update on seasonal fruit	Facebook update: seasonal fruit and vegetables Enjoy fruits and vegetables that are in season. That means better value, better taste and a better deal for the planet. To find out what fruits and vegetables are currently in seasons, see the Eat Seasonably calendar: http://eatseasonably.co.uk/what-to-eat-now/calendar/
11 June-Tuesday	How much is a portion of fruit / veg	Poster from the World Cancer Research Fund
12 June-Wednesday	Benefits on a diet high in fruits and vegetables	FIVE REASONS TO EAT MORE FRUITS AND VEGETABLES. 1. Fruit and vegetables taste delicious and there's so much variety to choose from. 2. They're a good source of vitamins and minerals, including folate, vitamin C and potassium. 3. They're an excellent source of dietary fibre, which helps maintain a healthy gut and prevent constipation and other digestion problems. A diet high in fibre can also reduce your risk of bowel cancer. 4. They can help reduce the risk of heart disease, stroke and some cancers. 5. Fruit and vegetables contribute to a healthy and balanced diet. Fruit and vegetables are also usually low in fat and calories (provided you don't fry them or roast them in lots of oil). That's why eating them can help you maintain a healthy weight and keep your heart healthy. JUICY JUNE is based on advice from the World Health Organization, which recommends eating a minimum of 400g of fruit and vegetables a day to lower the risk of serious health problems, such as heart disease, stroke, type 2 diabetes and obesity. We should be getting five 80g portions of fruit and vegetables every day. That's five portions of fruit and veg altogether, not five portions of each. To get the most benefit, your fruit and vegetable portions should include a variety of fruit and vegetables. This is because different fruits and vegetables contain different combinations of fibre, vitamins, minerals and other nutrients. Don't just rely on fruit juice for your five-a-day. It's ok to have the occasional glass, but if you eat whole fruits instead, it will help to bump up your fibre intake – and they also contain less sugar and fewer calories. Almost all fruit and vegetables counts.
14 June-Friday	How they deal with difficult situations	It's important to prepare for all kinds of difficult situations you might encounter during Juicy June. Any top tips?

15 June-Saturday	Half way through	Half way through everyone! Only 15 days to go!

Date posted	Category	Material published on Facebook
WEEK 3 OF JUICY JUNE		
17 June-Monday	How do they motivate themselves?	On those days when it's tough avoiding temptations, what do you do to motivate yourself to stick to your Juicy June plan?
18 June-Tuesday	Nutritional value of fruit and vegetables	Did you know that apricots are high in beta-carotene that helps us keep our eyes and skin healthy? Find out more about nutritional value of fruits and vegetables: http://www.greatgrubclub.com/a-z-fruit-veg
19 June-Wednesday	3 Word Wednesday	3 Word Wednesday: Give us 3 words to sum up your last Juicy June week.
20 June-Thursday	Facebook update	How is everyone's Juicy June going so far? No doubt you're learning lots along the way, so if you could give one tip to your fellow Juicy Juners, what would it be? Or maybe someone gave you the best piece of advice?
WEEK 4 OF JUICY JUNE		
24 June-Monday	Coming across doubters	We've all come across those doubters who think we can't finish Juicy June. When you're reaching the final days and it's getting tough, simply think of how their face will look when you continue for the last 5 days and prove them wrong!
26 June-Wednesday	Favourite part of Juicy June	What's your favourite part of the Juicy June? And what you don't like? Be honest and share yours in the comments!
27 June-Thursday	Juicy June mantra	What is your Juicy June mantra? We want to know that one phrase, quote or motto that keeps you going when swapping your foods gets tough.
1 July-Monday	Congratulations on completing Juicy June	Congratulations to everyone who completed Juicy June last Sunday! 'Like' this if you've completed Juicy June!

Appendix 5.6 Juicy June participant instructions

Welcome to Juicy June!
As there are only two days to go until Juicy June, we thought we will give you these final instructions to help you find answers to any last minute questions you might have.
What are we asking you to do?
In this study we are not simply asking you to start a new healthy eating behaviour (eating an extra portion of fruit or vegetable a day), but we are asking you to swap an unhealthy snack for a healthy snack. So for example, if you are having some chocolate after lunch, you might decide to swap the chocolate for some fruit and repeat that every day for 30 days. Recording how often you perform the healthy habit and how automatic it feels might help you establish the new healthy habit.
Three things that might help you change your habits
We believe that to make permanent changes in your diet you need three things:

- Knowledge
- Motivation for change
- Skills

Knowledge: The diet assessment that you have undertaken as part of this project hopefully helped you identify what your key issues are.
Motivation: Researchers have found that people have stronger motivation if they have choice over what and how they make changes, tackle something manageable, and feel that they are not doing this alone (that's why we've set up the Facebook page).
Skills: To be successful in changing your habit, we will help you to develop some new skills. For example, you might find it helpful to learn how to cope with situations when someone offers you foods you are trying not to eat. Two skills that we think might be particularly helpful are:

- **Monitoring your progress**
  Research evidence suggests that if you are paying attention to your behaviour, and recording the details, you are more likely to succeed and make a progress towards your goals. As eating Juicy June food would be a new habit for you, it is likely that it will slip from your mind. A good way of reminding yourself of your Juicy June swap is to set up a reminder that you think would work for you. Below are some suggestions of how you could possibly remind yourself about Juicy June every day:
    - *Place your Juicy June calendar in a prominent place (e.g. on the door of your fridge)*
    - *Set up a pop-up reminder in your online calendar or using your mobile phone*
    - *Stick a post-it note on your computer screen*
    - *Use our daily text message service (you just need to sign up to this by emailing Dorota at dj266@bath.ac.uk)*
    - *Download a food diary application for your smartphone*

- **Be prepared.**
  - *Plan ahead to maximise your chance of success*. According to nutrition experts, the most effective way to improve your snacking habit is to make plans concerning *where, when*, and *how* you will make changes. These are called '*if-then plans'.* An example of the 'if-then plan' would be: 'If I'm having my afternoon tea, then I will reach for an apple!". But for the 'if-then plans' to work, it's a good idea to be prepared in advance. For example, if you plan to have an apple instead of a biscuit with your afternoon tea at work, make sure you have the apple handy. Plan in advance. Add Juicy June food to your shopping list. It might also be a good idea to keep away from the foods that you're trying not to eat. Do not store biscuits at home/ work, because the temptation might be too strong to resist.
  - *Plan how to deal with unhelpful situations.* Prepare for situations that might undermine your attempts. For example, what are you going to do when someone offers you a biscuit when you are trying not to eat them? Knowing what you could say in advance may help you in the heat of the moment.

FAQ

What if I miss my Juicy June food?
No worries if you miss your fruit or veg once or twice. This will not stop you forming your new healthy habit significantly. But be careful not to miss your fruit or veg more than twice. If you miss them more than twice, maybe think about setting up a different reminder.

Can I change more than one thing?
Juicy June is 'one step at a time approach'. If you are trying to change too many things, you may only manage for a while and then falter. The best way to make changes is to concentrate on making one change at a time and make sure it becomes your habit before you move onto the next change. This way you will be more likely to make a permanent change towards a healthier lifestyle.

Does the replacement item have to be exactly the same every day?
No, it could be different types of fruits or vegetables every day, however some people find it easier to remember if they are having the same type every day.

Would it help if I had support from other people?
Some people say they work best on their own, while others work best if they have support. It might be a good idea to tell your family, friends and work colleagues about Juicy June so that they might be supportive. You could even encourage them to sign up too!

What happens after Juicy June?
We hope Juicy June will give you some experience of making a change, and fitting it into your lifestyle without too much trouble. It might help you find out how many times you need to repeat one behaviour before it becomes your habit (something that you don't have to consciously have to think about). And if you find it easy to keep going at the end of the month, you might attempt changing something else (e.g. using the stairs instead of the lift).

How is evaluation of the study done?
Each Friday we will send you a very short questionnaire (3 questions) to help us assess how you are getting on. We will also ask you to complete an online questionnaire after you finish Juicy June, and approximately one month after the end of the project that will help us to give you feedback on how you have done during that month.

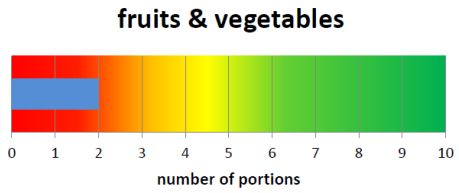
Any other questions? Why not post them on Facebook (https://www.facebook.com/BathUniJuicyJune) or email them to Dorota at dj266@bath.ac.uk

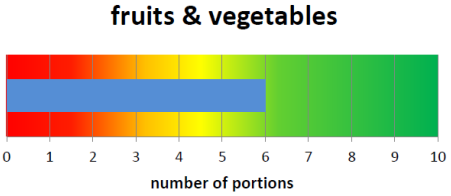
Appendix 5.7 Juicy June final diet feedback

YOUR DIET FEEDBACK

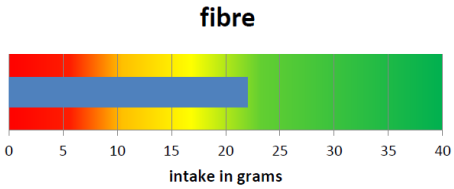
Thank you for filling in the questionnaire evaluating Juicy June. Now we can give you feedback compairng your diet scores before and after Juicy June. On the left you will find 3 graphs showing your daily intakes of fruits & vegetables, fat and fibre *before* Juicy June, while on the right *after* Juicy June. Graphs have a traffic light colours background representing the recommended intakes of these foods (for fruits & vegetables and fibre: red-low; orange- medium, green- high; and reverse for fat: green-low, orange-medium, red- high).

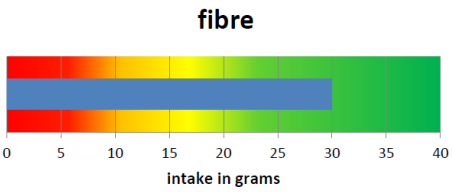
FRUITS AND VEGETABLES INTAKE



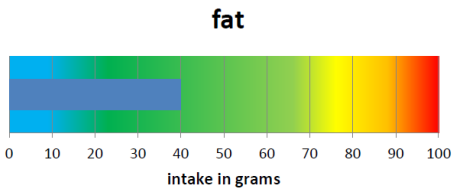


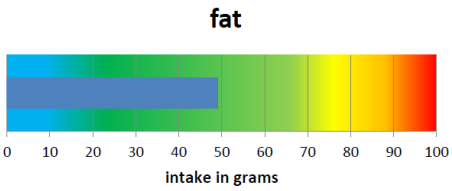
FIBRE INTAKE





FAT INTAKE





Your diet feedback

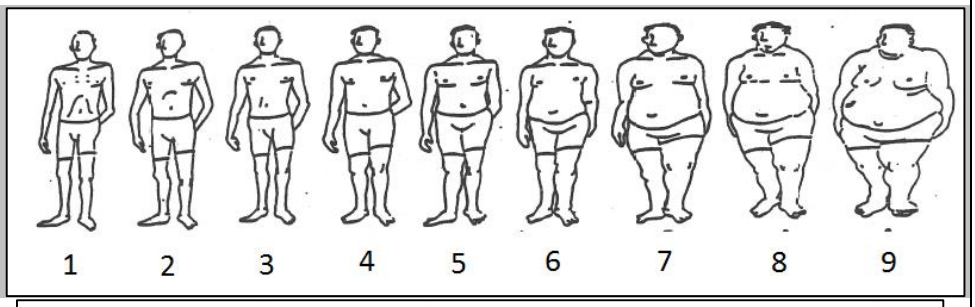
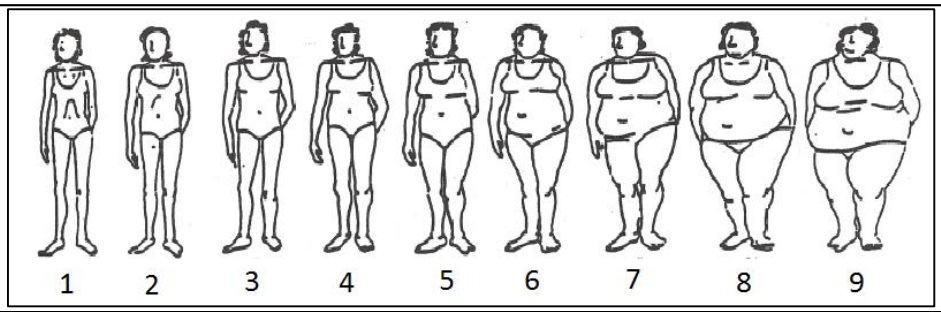
Well done! Looking at your overall feedback you have improved your fruit and vegetables intake. You are now eating on average 6 portions of fruit and vegetables a day and you meet the recommended intake for these (at least 5 portions of fruit and vegetables a day). You have also increased your fibre intake, which is a very good thing as fibre helps us maintain digestive health. Finally, your fat intake has remained at the low recommended level.

Where can you find more information?

If you would like to find out more about healthy eating, visit Change For Life website, where you can find many useful tools and tips: http://www.nhs.uk/Change4Life/Pages/healthy-eating.aspx

Appendix 5.8 Questionnaires incorporated in study 4

5.8.1 Perceived health status

What is your smoking status	never smoked		ex-smoker	current smoker	
Do you know what is your height?	Feet__ inches__			or cm___	
Do you know what is your weight?	St__ lb__			or kg__	
In general, would you say your health is?	Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)
How would you describe your current weight?	Very underweight (1)	Somewhat underweight (2)	About right (3)	Slightly overweight (4)	Very overweigh t (5)
Please indicate the figure that most resembles you					
					

How concerned are you about your current weight?	Not at all concerned (1)	Not very concerned (2)	Quite concerned (3)	Very concerned (4)
Do you consider your weight as harmful to your health?	Not at all harmful (1)	Not very harmful (2)	Quite harmful (3)	Very harmful (4)
Which category best describes you?	Not doing anything in particular for my weight (1)	Actively doing things to try to gain weight (2)	Actively doing things to try to lose weight (3)	Actively doing things to try to avoid gaining weight (4)

5.8.2 Social support for healthy eating

Below is a list of things people might do or say to someone who is trying to eat a healthy diet. Some of the questions may not apply to you, but please read and give an answer to every question. How often in the last 30 days did your family, friends, acquaintances, or co-workers do the following?

	None	**Rarely**	**A few times**	**Often**	**Very often**	**Dose not apply**
Encourage you to eat healthy foods.	1	2	3	4	5	0
Discuss the benefits of eating healthy foods.	1	2	3	4	5	0
Eat unhealthy foods in front of you.	5	4	3	2	1	0
Remind you to choose healthy foods.	1	2	3	4	5	0
Share ideas on healthy eating.	1	2	3	4	5	0
Bring home foods you're trying not to eat.	5	4	3	2	1	0
Eat healthy meals with you.	1	2	3	4	5	0
Complain about eating healthy foods.	5	4	3	2	1	0

5.8.3 Diet assessment

Have you eaten any of the following foods in the LAST 24 HOURS?

	0	**1**	**2**	**3**	**4 or more**
Fruit for breakfast, e.g. on cereal	0	1	2	3	4
Fruit or vegetable as a between meal snack (including dried fruits such as raisins or apricots)	0	1	2	3	4
A glass of pure, unsweetened fruit juice (not squashes or fruit drink)	0	1	1	1	1
Fruit as a starter to a meal	0	1	2	3	4
A baked potato	0	1	2	3	4
A bowlful of home-made style vegetable soup	0	1	2	3	4
Portions of vegetables with main meals (include baked beans and pulses as vegetables but not potatoes)	0	1	2	3	4
A vegetable based meal	0	1	2	3	4
A bowlful of salad	0	1	2	3	4
Fruit as a dessert	0	1	2	3	4

About how many pieces or slices per day do you eat of the following types of bread, rolls, or chapattis? (Choose one answer on each line)

Breads & Rolls	**None**	**Less than 1 a day**	**1 to 2 a day**	**3 to 4 a day**	**5 or more a day**
White bread or white rolls	0	1	4	9	13
Brown or granny bread or rolls	0	2	7	15	22
Wholemeal bread or rolls	0	3	8	18	26

About how many rounded teaspoons per day do you usually use of the following types of spreads, for example on bread, sandwiches, toast, potatoes, or vegetables? (Choose one answer on each line)

	None	1	2	3	4	5	6	7 or more
Regular margarine, butter or Reduced fat spread such as sunflower or olive spread, Flora Vitalite, Clover, Olivio, Stork, Utterly Butterly	0	4	8	12	16	20	24	28
Low fat spread such as Flora Light, St. Ivel Gold, half-fat butt Olivite, Flora Pro-activ, Light spread	0	2	4	6	8	10	12	14

About how many servings per week do you eat of the following types of breakfast cereal or porridge? (Choose one answer on each line)

Breakfast cereals	None	Less than 1 a week	1 to 2 a week	3 to 4 a week	5 or more a week
Sugared type: Frosties, Coco Pops, Ricicles, Sugar Puffs **Rice or Corn type: Corn Flakes, Rice, Krispies, Special K**	0	0	0	1	2
Porridge or Redy Brek **Wheat type: Shredded Wheat, Start, Weetabix, Fruit 'n Fibre, Puffed Wheat** **Muesli type: Alpen, Jordan's**	0	1	2	5	7
Bran type: All-Bran, Bran Flakes, Country Bran	0	2	5	12	18

About how many servings per week do you eat of the following foods?

Vegetable and fruit	None	Less than 1 a week	1 to 2 a week	3 to 5 a week	6 to 7 a week	8 to 11 a week	12 or more a week
Pasta or rice	0	0	1	3	4	6	8
Potatoes	0	0	1	3	5	8	10
Peas	1	1	3	8	12	16	24
Beans (baked, tinned or dried or lentils)	1	1	4	10	15	20	30
Other vegetable (any type)	0	0	1	2	3	5	6
Fruit (fresh, frozen or canned)	0	0	1	3	5	8	10

About how many servings PER WEEK do you eat of the following foods? (Choose one answer on each line)

	None	Less than 1 a week	1 to 2 a week	3 to 5 a week	6 or more a week
Cheese (any except cottage)	1	1	2	6	9
Beefburgers or sausages	1	1	2	4	6
Beef, pork, or lamb (for vegetarians: nuts)	1	1	2	6	9
Bacon, meat pie, processed meat	1	1	2	5	8
Chicken or turkey	0	0	1	3	5
Fish (NOT fried fish)	0	0	0	1	2
ANY fried food: fried fish, chips, cooked breakfast, samosas	1	1	2	6	9
Cakes, pies, puddings, pastries	1	1	2	5	8
Biscuits, chocolate, or crisps	1	1	2	4	6

About how much of the following types of milk do you yourself **use per day**, for example in cereal, tea or coffee? (choose one answer on each line)

Milk	None	Less than a quarter pine	About a quarter pint	About half pint	1 pint or more
Whole milk (blue top)	0	1	3	6	12
Semi-skimmed milk (green top)	0	0	1	3	6
Skimmed (red top)	0	0	0	0	0

Snack intake questionnaire

Please think about what you ate during the past week and mark the columns that show, on average, how many times you ate the food. If you did not eat this food or drink this beverage during the past week, please mark "never or less than 1 per week.

	Never or less than one per week	1 per week	2-4 per week	5-6 per week	1 per day	2+ per day
CRISPS & POPCORN including tortilla/corn chips (e.g. Doritos), vegetable chips and puffs	1	2	3	4	5	6
OTHER SALTY SNACKS e.g. savoury biscuits, pretzels, crackers.	1	2	3	4	5	6
SWEETS & GUMS e.g. candies, fruit jellies, fudge, toffees (do not include chocolate sweets)	1	2	3	4	5	6
CHOCOLATE (all types including dark) and chocolate sweets (do not include biscuits)	1	2	3	4	5	6
BISCUITS AND COOKIES such as Jaffa cakes, Hobnobs, digestives, chocolate chip cookie	1	2	3	4	5	6
BAKERY e.g. croissants, pastries, muffins, doughnuts	1	2	3	4	5	6
CAKES	1	2	3	4	5	6
CHILLED DESSERTS e.g. tiramisu or trifles	1	2	3	4	5	6
ICE CREAM & MILKSHAKES including frozen yoghurt	1	2	3	4	5	6
NUTS & DRIED FRUITS (including covered for example in chocolate or salted)	1	2	3	4	5	6
CEREAL BARS e.g. granola bars or flapjacks	1	2	3	4	5	6

5.8.4 Motivation for weight control

Many people take steps to control their weight by eating a healthy diet, exercising or doing both. Thinking about the occasions when you change what you eat or how much exercise you take for health reasons, please indicate what are the reasons you have in mind:

	1 (not at all true)	**2**	**3**	**4**	**5**	**6**	**7 (very true)**
Because I feel that I want to take responsibility for my own health.	1	2	3	4	5	6	7
Because I would feel guilty or ashamed of myself if I did not eat a healthy diet.	1	2	3	4	5	6	7
Because I personally believe it is the best thing for my health.	1	2	3	4	5	6	7
Because others would be upset with me if I did not.	1	2	3	4	5	6	7
I really don't think about it.	1	2	3	4	5	6	7
Because I have carefully thought about it and believe it is very important for many aspects of my life.	1	2	3	4	5	6	7
Because I would feel bad about myself if I did not eat a healthy diet.	1	2	3	4	5	6	7
Because it is an important choice I really want to make.	1	2	3	4	5	6	7
Because I feel pressure from others to do so.	1	2	3	4	5	6	7
Because it is easier to do what I am told than think about it.	1	2	3	4	5	6	7
Because it is consistent with my life goals.	1	2	3	4	5	6	7
Because I want others to approve of me.	1	2	3	4	5	6	7
Because it is very important for being as healthy as possible.	1	2	3	4	5	6	7
Because I want others to see I can do it.	1	2	3	4	5	6	7
I don't really know why.	1	2	3	4	5	6	7
I never change what I eat or how much I exercise for health reasons.	1	2	3	4	5	6	7

5.8.5 Adherence to Juicy June swap

How many times in the past week did you have your usual snack (food that you're trying to avoid during Juicy June)?	**None**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8 or more**
How many times in the past week did you have your Juicy June foods?	None	1	2	3	4	5	6	7	8 or more

Eating my Juicy June foods is something:

	Strongly disagree	**disagree**	**not sure**	**agree**	**strongly agree**
I do automatically.	1	2	3	4	5
I do without having to consciously remember.	1	2	3	4	5
I do without thinking.	1	2	3	4	5
I start doing before I realise I'm doing it.	1	2	3	4	5

5.8.6 Reason for participating in Juicy June

Why did you participate in Juicy June? Please select all that apply:

- As a personal challenge
- To increase the number of portions of fruit or vegetables that I eat
- To help me improve my eating habits
- To lose weight
- To be a role model to others
- To participate with friends
- To participate with work colleagues
- To participate with partner
- To cut back on unhealthy food that I eat
- Participate with or challenged by someone else
- Other (please specify)

How likely or unlikely is that you will continue with your Juicy June swap regularly in the future?						
1 (very unlikely)	2	3	4 (neither likely not unlikely)	5	6	7 (Very likely)

5.8.8 Experience of participation in Juicy June

	Strongly disagree	disagree	not sure	agree	strongly agree
It was easier to swap one unhealthy habit within my diet for one healthy alternative for one month through participating in Juicy June, than it would be to do the same change on my own.	1	2	3	4	5
As a result of participating in Juicy June, I am more likely to consider whether I could swap other foods for fruits or vegetables.	1	2	3	4	5
As a result of participating in Juicy June, I am more aware of the benefits of fruits and vegetables for my health.	1	2	3	4	5
During Juicy June, I felt a part of Juicy June community.	1	2	3	4	5
During Juicy June, I had more conversations about healthy eating (e.g. eating more fruits or vegetables) with friends and family than I normally would.	1	2	3	4	5

	never	rarely	sometimes	Most of the time	always	Don't know
During Juicy June, I felt I had to explain to other people why I wasn't eating some foods.	1	2	3	4	5	0
During Juicy June, people commented on the fact that I was eating more fruits and/or vegetables.	1	2	3	4	5	0
During Juicy June, did you find yourself eating other unhealthy snacks to compensate for the snacks you gave up for Juicy June?	1	2	3	4	5	0

How easy/difficult did you find swapping one unhealthy habit within your diet for one healthy alternative for a month?	Very easy	easy	Neither easy nor difficult	difficult	Very difficult

5.8.9 Basic need support and thwarting

The following statements represent different feelings that people have when taking part in Juicy June. Please indicate how much you agree or disagree by considering how you typically felt when you were taking part in Juicy June:

	Strongly disagree	**Disagree**	**Not sure**	**Agree**	**Strongly agree**
I didn't really feel connected with other people who took part in Juicy June.	5	4	3	2	1
The fact that I couldn't choose what I ate during Juicy June frustrated me.	5	4	3	2	1
During Juicy June, I felt part of a Juicy June group/community.	1	2	3	4	5
If I could choose, I would do things differently during Juicy June.	5	4	3	2	1
During Juicy June, I could talk with people about things that really mattered to me.	1	2	3	4	5
During Juicy June, I didn't feel competent at making dietary changes.	5	4	3	2	1
During Juicy June, I felt like I can be myself.	1	2	3	4	5
I didn't really mix with other participants during Juicy June.	5	4	3	2	1
I doubt whether I was able to execute Juicy June properly.	5	4	3	2	1
Regulating my food intake as a part of Juicy June sometimes was a cause of tension with people who are important to me	5	4	3	2	1
I was good at the things I was doing while taking part in Juicy June.	1	2	3	4	5
During Juicy June, I often felt like I had to follow other people's commands.	5	4	3	2	1
Sticking to my Juicy June plan sometimes seemed an impossible task.	5	4	3	2	1
The tasks I had to do during Juicy June were in line with what I really wanted to do.	1	2	3	4	5
Regulating my eating behaviours as a part of Juicy June sometimes created distance to other people.	5	4	3	2	1
Sometimes I had the feeling that I would never be able to regulate my food intake in line with Juicy June.	5	4	3	2	1
I felt free to take part in Juicy June the way I think it could best be done.	1	2	3	4	5
I felt competent at taking part in Juicy June	1	2	3	4	5
During Juicy June, I felt forced to do things I did not want to do.	5	4	3	2	1
I really mastered the tasks that were part of Juicy June.	1	2	3	4	5
I had the feeling that I could even accomplish the most difficult tasks involved in Juicy June.	1	2	3	4	5
I had the feeling I had no other choice or was under pressure to eat in line with Juicy June.	5	4	3	2	1

5.8.10 Habit strength formation

Eating my Juicy June foods is something

	Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
I do frequently.	1	2	3	4	5
I do automatically.	1	2	3	4	5
I do without having to consciously remember.	1	2	3	4	5
that makes me feel weird if I do not do it.	1	2	3	4	5
I do without thinking.	1	2	3	4	5
would require effort not to do it.	1	2	3	4	5
that belongs to my (daily, weekly, monthly) routine.	1	2	3	4	5
I start doing before I realize I'm doing it.	1	2	3	4	5
I would find hard not to do.	1	2	3	4	5
I have no need to think about doing.	1	2	3	4	5
that's typically 'me'.	1	2	3	4	5
I have been doing for a long time.	1	2	3	4	5

5.8.11 Juicy June message assessment

Now we would like to ask you 6 questions about the Juicy June message. Juicy June used the following message: Juicy June. Juice-up your diet! Better health, one bite at a time!

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
This message motivated me to eat healthier.	1	2	3	4	5
This message makes changing eating habits seem like a much simpler issue than it really is.	5	4	3	2	1
This message made me concerned about my eating habits and/or my body weight.	5	4	3	2	1
This message makes changing eating habits seem attainable.	1	2	3	4	5
This message is helpful for people who want to improve their eating habits.	1	2	3	4	5
This message promotes negative attitudes about overweight/obese persons.	5	4	3	2	1

5.8.12 Juicy June experience

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Juicy June provided a clear action or behaviour for me to engage in to improve my diet.	1	2	3	4	5
Juicy June offered strategies for achieving the intended change in my diet.	1	2	3	4	5
I feel like I had the ability to engage in swapping my unhealthy snack for a healthier one promoted in Juicy June.	1	2	3	4	5
Juicy June gave me a 'kick-start' to make a change in my diet.	1	2	3	4	5
Juicy June inspired me to introduce other dietary changes in the future	1	2	3	4	5

5.8.13 Intention to continue with Juicy June swap

Choose the one best statement that fits your preferences

- I’m not thinking about eating more fruit.
- I’m thinking about eating more fruit planning start within 6 months.
- I’m definitely planning to eat more fruit in the next month.
- I'm trying to eat more fruit now.
- I'm already eating 3 or more servings of fruit each day.

Choose the one best statement that fits your preferences

- I’m not thinking about eating more vegetables
- I’m thinking about eating more vegetables planning start within 6 months
- I’m definitely planning to eat more vegetables in the next month
- I'm trying to eat more vegetables now
- I'm already eating 3 or more servings of vegetables each day

Appendix 5.9 Internal reliability of measures used in Juicy June

Measure	Reliability reported in the development paper Cronbach's alpha	Reliability in the current study- Cronbach's alpha
Weight Locus of Control (Saltzer, 1982).	0.67	0.73
Social support for healthy eating (Sallis et al., 1987).	0.70	0.65.
Perceived competence for dietary change (Williams & Deci, 1996; Williams, Freedman, & Deci, 1998)	over 0.80	0.86
Treatment Self-Regulation Questionnaire (TSRQ) (Levesque et al., 2007)	Cronbach's α ranging from 0.58 to 0.93 (Levesque et al., 2007; Williams et al., 1996).	0.79 (Cronbach's alpha for autonomous motivation subscale= 0.89; for controlled motivation= 0.78 and for amotivation= 0.46).
Self-Report Behavioural Automaticity Index (Gardner, Abraham, et al., 2012).	0.80	0.89
Basic need support and thwarting was assessed by 22 questions combined from two measures [diet-specific need frustration (Verstuyf et al., 2012) and Work-related Basic Needs Satisfaction Scale (Broeck et al., 2010)]	Diet-specific need frustration internal reliability (Cronbach's alpha = 0.86). Work-related Basic Needs Satisfaction Scale has good internal reliability (Cronbach's α for autonomy subscale= 0.81, competence= 0.85, relatedness = 0.82).	The reliability of each subscale was as follows: autonomy support Cronbach's alpha= 0.49, autonomy thwarting Cronbach's alpha= 0.53, competence support Cronbach's alpha= 0.84, competence thwarting Cronbach's alpha= 0.74, relatedness support Cronbach's alpha=.50 and relatedness thwarting Cronbach's alpha= 0.54.
"Important Other" Climate Questionnaire for Diet (Williams, Lynch, et al., 2006)	0.95	0.82
Reaction to Juicy June message Puhl et al. (2012):	Favourable reactions to the message: 0.82-0.93, negative attitudes to the message 0.71-0.84	Favourable reactions to the message (3 items)- 0.83, negative reaction to the message 0.60

Appendix 5.10 Differences between completers and non-completers of Juicy June

Differences between completers and non-completers of Juicy June (at baseline)

	Total M (sd)	Non-completers* M (sd)	Completers** M (sd)	F value
Age	34.76 (10.33)	32.83 (8.62)	35.70 (11.01)	F(1,90)= 1.56, p= .21
BMI (baseline)	25.74 (5.74)	25.34 (4.97)	25.95 (6.12)	F(1,89)= .23, p= .63
Weight harmful to health	2.18 (0.84)	2.03 (0.81)	2.26 (0.85)	*F*(1,90)= 1.49, *p*= .22
Weight figure rating (between 1 and 9)	4.81 (1.54)	4.66 (1.42)	4.88 (1.60)	*F*(1,90)= .40, *p*= .53
Weight Locus of Control (external scoring direction)	8.54 (3.52)	8.93 (4.40)	8.36 (3.03)	*F*(1,90)= .53, *p*= .47
Fruit & veg (number of portions)	4.52 (2.75)	4.50 (3.28)	4.54 (2.48)	*F*(1,90)= .01, *p*= .95
Fibre (in grams)	17.52 (9.68)	16.87 (12.01)	17.82 (8.41)	*F*(1,90)= .21, *p*= .65
Fat (in grams)	49.47 (21.94)	46.50 (22.58)	50.93 (21.66)	*F*(1,90)= .89, *p*= .37
Snack intake	18.75 (4.31)	18.40 (4.49)	18.93 (4.25)	*F*(1,90)= .31, *p*= .58
Social support for healthy eating	22.21 (5.53)	23.43 (6.32)	21.61 (5.04)	*F*(1,90)= 2.22, *p*= .14
Autonomous motivation	31.27 (7.70)	31.26 (8.92)	31.28 (7.11)	*F*(1,90)= .00, *p*= .99
Controlled motivation	19.35 (7.20)	19.80 (5.89)	19.13 (7.80)	*F*(1,90)= .17, *p*= .68
Amotivation	7.46 (3.40)	7.30 (3.46)	7.54 (3.40)	*F*(1,90)= .10, *p*= .75

** non-completers defined as those who completed baseline evaluation only (n=30)*
*** completers defined as those who completed baseline evaluation and 4-week evaluation (n=61)*

Appendix 5.11 Participants experience of taking part in Juicy June

	N (61)	%
It was easier to swap one unhealthy habit within my diet for one healthy alternative for one month through participating in Juicy June, than it would be to do the same change on my own.		
Strongly disagree/ disagree	14	23.0
Don't know	8	13.1
Agree/ strongly agree	39	63.9
As a result of participating in Juicy June, I am more likely to consider whether I could swap other foods for fruits or vegetables.		
Strongly disagree/ disagree	11	18.0
Don't know	5	8.2
Agree/ strongly agree	45	73.8
As a result of participating in Juicy June, I am more aware of the benefits of fruits and vegetables for my health.		
Strongly disagree/ disagree	28	45.9
Don't know	9	14.8
Agree/ strongly agree	24	39.3
During Juicy June, did you find yourself eating other unhealthy snacks to compensate for the snacks you gave up for Juicy June?		
Never/ rarely	27	60.7
Sometimes	20	32.8
Most of the time/ always	3	4.9
Don't know	1	1.6
How easy/difficult did you find swapping one unhealthy habit within your diet for one healthy alternative for a month?		
Very easy/ easy	16	26.2
Neither easy nor difficult	15	24.6
Difficult/ very difficult	30	49.2
During Juicy June, I felt a part of Juicy June community.		
Strongly disagree/ disagree	31	50.8
Don't know	14	23.0
Agree/ strongly agree	16	26.2
During Juicy June, I had more conversations about healthy eating (e.g. eating more fruits or vegetables) with friends and family than I normally would.		
Strongly disagree/ disagree	25	41.0
Don't know	10	16.4
Agree/ strongly agree	26	42.6
During Juicy June, I felt I had to explain to other people why I wasn't eating some foods.		
Never/ rarely	41	67.2
Sometimes	19	31.1
Most of the time/ always	1	1.6
During Juicy June, people commented on the fact that I was eating more fruits and/or vegetables.		
Never/ rarely	45	73.8
Sometimes	10	16.4
Most of the time/ always	4	6.5
Don't know	2	3.3

Juicy June message perception

	N (37)	%
Juicy June message motivated me to eat healthier.		
Strongly disagree/ disagree	7	18.9
Don't know	11	29.7
Agree/ strongly agree	19	51.4
This message makes changing eating habits seem like a much simpler issue than it really is.		
Strongly disagree/ disagree	7	18.9
Don't know	11	29.7
Agree/ strongly agree	19	51.4
This message made me concerned about my eating habits and/or my body weight.		
Strongly disagree/ disagree	15	40.5
Don't know	7	19
Agree/ strongly agree	15	40.5
This message makes changing eating habits seem attainable.		
Strongly disagree/ disagree	4	10.8
Don't know	6	16.2
Agree/ strongly agree	27	73
This message is helpful for people who want to improve their eating habits.		
Strongly disagree/ disagree	1	2.7
Don't know	8	29.6
Agree/ strongly agree	28	67.7
This message promotes negative attitudes about overweight/obese persons.		
Strongly disagree/ disagree	30	81.1
Don't know	6	16.2
Agree/ strongly agree	1	2.7

Juicy June and self-efficacy

	N (37)	%
Juicy June provided a clear action or behaviour for me to engage in to improve my diet.		
Strongly disagree/ disagree	0	0
Don't know	7	18.9
Agree/ strongly agree	30	81.1
Juicy June offered strategies for achieving the intended change in my diet.		
Strongly disagree/ disagree	2	5.4
Don't know	7	18.9
Agree/ strongly agree	28	75.7
I feel like I had the ability to engage in swapping my unhealthy snack for a healthier one promoted in Juicy June.		
Strongly disagree/ disagree	0	0
Don't know	4	10.8
Agree/ strongly agree	33	89.2
Juicy June gave me a 'kick-start' to make a change in my diet.		
Strongly disagree/ disagree	3	8.1
Don't know	8	21.6
Agree/ strongly agree	26	70.3
Juicy June inspired me to introduce other dietary changes in the future.		
Strongly disagree/ disagree	4	10.8
Don't know	9	24.3
Agree/ strongly agree	24	64.9

Appendix 5.12 Demographic characteristics of discussion group participants

Participant name*	Claire	Rebecca**	Elizabeth	Martha	Amanda	Sarah
Age	25	26	25	58	40	45
Juicy June swap	Chocolate as a snack at work/ Fresh fruit or dried fruit and nuts as a snack instead	replaced having an unhealthy snack in the afternoon with having some fruit	Replaced eating biscuits with eating fruit.	Replaced afternoon biscuits for a fruit/dry fruit snack	Replaced mid-morning snack for a banana	Eating crisps at lunchtime, swapped crisps for fruit
Baseline BMI	24.02	23.20	18.59	26.30	24.49	24.61
Evaluation BMI	23.76	23.11	18.59	missing	missing	missing
Baseline fruit and veg intake	5	5	4	4	6	0
Evaluation fruit and veg intake	12	8	7	8	7	8
Baseline fibre intake	31	20	18	15	33	24
Evaluation fibre intake	29	19	26	24	21	41
Baseline fat intake	45	30	73	89	107	73
Evaluation fat intake	38	18	55	83	52	33
Snack intake baseline	30	13	20	25	32	18
Snack intake at evaluation	19	10	18	22	22	12

**Pseudonyms selected by participants.*

*** low scores on fat for this participant are due to weight loss diet that participants was on during the study*

Appendix 5.13 Materials used in the discussion group.

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Appendix 5.14 Juicy June discussion group topics

1. **Warm-up**
    a. Please tell me your name and one word that would sum up Juicy June. (*My name is Dorota and one word that would sum up Juicy June would be exciting!*)

2. **Eating a healthy diet**
    a. Why is it difficult not to snack?
    b. Have you tried changing your eating habits before? What have you learnt from this experience?

3. **Juicy June experience**
    a. **Reasons for taking part**
        i. Why did you decide to take part in Juicy June?
        ii. What did you think about diet feedback? (was it helpful? What were you expecting?)
    b. **Monitoring progress**
        i. Did you use or set up any reminders? (what do you think about Juicy June calendar)
        ii. Did you monitor your progress? If yes, how did you do it? (Juicy June calendar?)
        iii. When does it become your habit or at least easier to do?
    c. **Social support**
        i. Did you tell your friends, family, colleagues about Juicy June? Were they supportive?
        ii. Did you use Facebook Juicy June page?
        iii. Did you find it helpful/ interesting?
        iv. Why do you think people were not interacting on FB?
        v. Did any of you participate with friends/ colleagues/ partner? Did it make a difference?
    d. **Experience of success**
        i. How would you decide if Juicy June was successful for you?
        ii. Would eating more fruits (not giving up snacks), be a success?

    e. **Compensation**
        i. Some participants felt that it was difficult for them to stop snacking? Was it the case for you?
        ii. Some felt that they were eating other unhealthy snacks to compensate for the snacks they gave up for Juicy June? So for example, someone have up biscuits and was having some fruit instead of biscuits, but would still eat other snacks instead. Why do you think is that?

f. Other comments

i. What was difficult and what was easy about completing Juicy June?

1. *Refusing biscuits/ temptation of unhealthy food in the office*
2. *Making sure you have fruits available*
3. *Changing routine*
4. *Eating while being away/ not cooking for yourself*

4. Long term changes

a. What have you learnt from Juicy June?

b. Do you intend to carry in with what changes you made?

c. Do you plan any other long term change?

5. Comparison with tobacco and alcohol interventions

a. Have you heard about Dryathlon or Dry January or Stoptober *(if not explain)*

b. Do you think it is easier to stop drinking alcohol for a month or stop snacking and why?

c. Do you think it is easier to stop doing something rather than stop doing something unhealthy and start doing something healthy?

d. Do you think using celebrities is helpful?

Appendix 5.15 Main themes and sub-themes identified in the data.

Main theme	Sub-theme	Example quote
POSITIVE EXPERIENCE	*Perceived benefits of taking part in Juicy June*	(Amanda): It was a success for me 'cause… it was a small goal but I managed to do it and umm it made me feel a lot better in the mornings you know having fruit rather than a biscuit or pastry or something.
	Swap rather than elimination	(Elizabeth): Cause in the past I thought oh I should eat more fruit and veg but I thought if I just eat 5 pieces of fruit and five vegetables that would like, be it. But then instead of just trying to add something else which doesn't really have a place in your daily routine, trying to replace something else that you already have makes sense.
NOT USING JUICY JUNE RESOURCES	*Lack of engagement in the Juicy June Facebook community*	(Elizabeth): I went onto it *(Facebook community page)* at the end of the surveys, but I didn't do it in between. (Sarah): And that's not normally the sort of thing I would put on Facebook. So I think that's why I didn't in the end. Hey people I've eaten a banana, who is interested?
	Not using self-monitoring tools	(Amanda): I had mine (*Juicy June calendar*) at home and I have to admit I… it was kind of lost under various pieces of paper [laughs], so I did use it but… I thought it was a nice aid but I didn't use it hugely and then I kind of guessed at the end of the week. Yeah I gave myself a tick.
TRANSLATING INTENTIONS AND PLANS INTO ACTIONS	*A nudge to act*	(Martha): You're always postponing (*introducing dietary changes*), aren't you? (Sarah): Just have something to give you a kick start, a little push really helped. Cause otherwise if I had to make my own mind up…
	Positive impact on future plans	(Amanda): And I think I might try another one (*dietary swap*) now. Like a different one, but like a really small one. I found it because it was manageable I thought oh I can maybe try and think of something else to do.

Main themes and sub-themes identified in the data continued.

Main theme	Sub-theme	Example quote
DIFFICULT TO ELIMINATE UNHEALTHY SNACKS	*Compensating*	(Amanda): I wondered if I sometimes ate actually I think I've had some chocolate in the evenings and I wondered whether I've sort of maybe had a little bit more chocolate in the evenings as a kind of didn't I do well had my banana… So I do wonder whether I did a little bit of transferring.
	Unhealthy snacks associated with strong habits	(Martha): In my case it's a habit. I might be on my own at home, but if I make a cup of tea or coffee I just have to, wait a minute, I'm missing something and have to have something with it.
	Craving unhealthy snacks	(Claire): So some days I was happy enough just having fruit, whereas other days I would have fruit and then have chocolate, but I was kind of like well at least I'm kind of balancing it out by eating more fruit which is healthier.
	No support from social environment	(Amanda): I think nowadays it's just so easy to buy kind of not good stuff... (Sarah): We always have crisps in our kitchen (at work) and chocolate bars that we can go and buy anytime... And it was just having that thought and again that discipline to say no I won't walk down to the kitchen and see what's in the fridge.
	Fruit and vegetables not very appealing	(Elizabeth): I think also it just seems more interesting to have, like there is lots of different types of snack food, whereas if you buy fruit to make it interesting you sort of have to plan ahead and prepare it in a different way like make a fruit salad or bake it or do something with it to make it more interesting.